AMERICAN GAS JOURNAL

JANUARY, 1939

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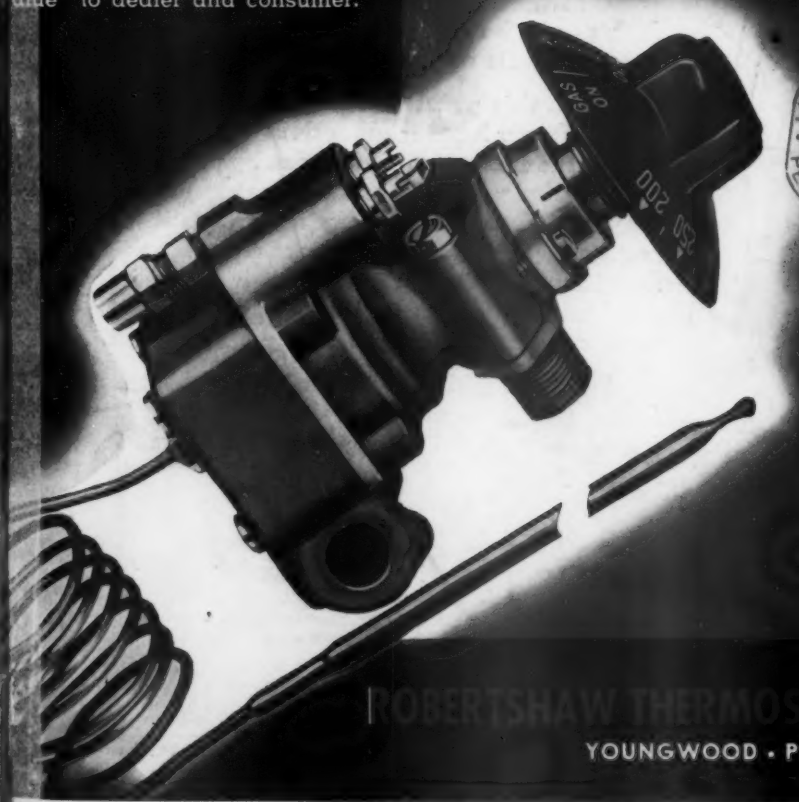

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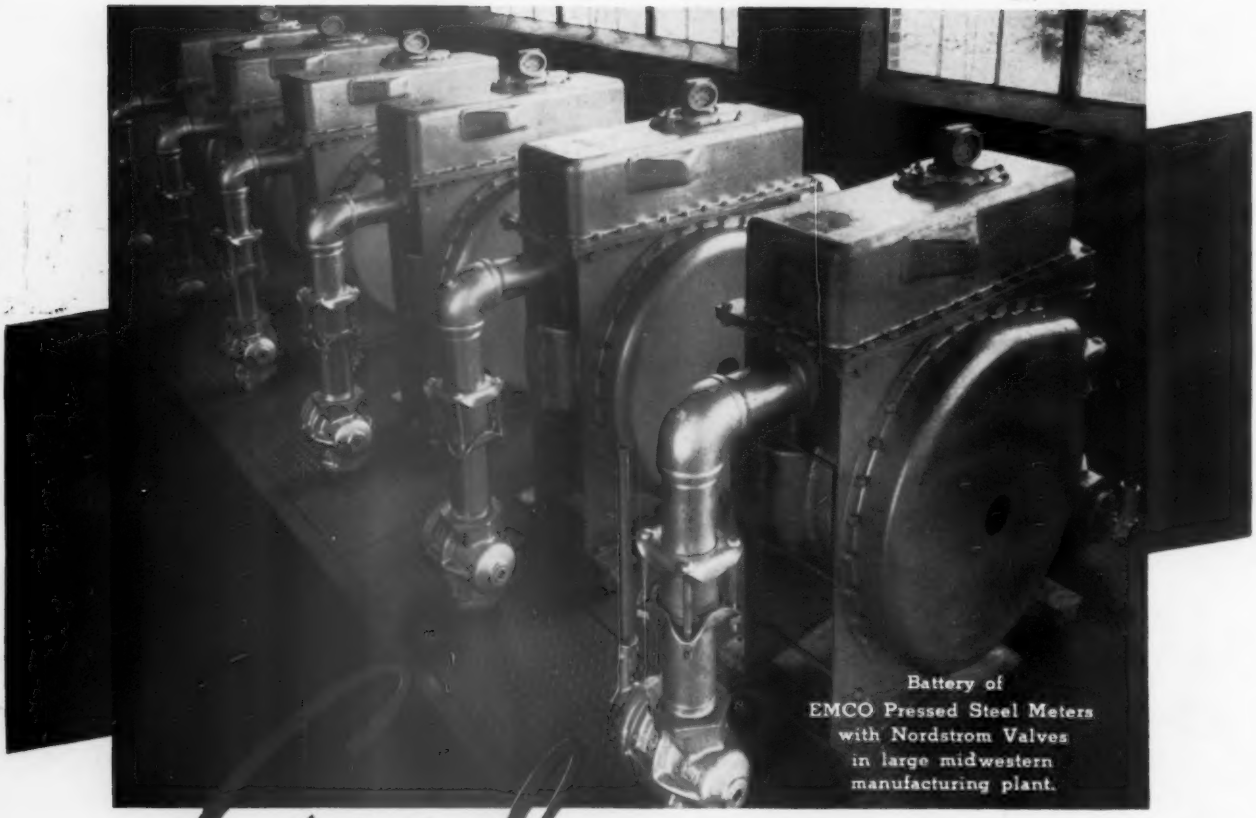

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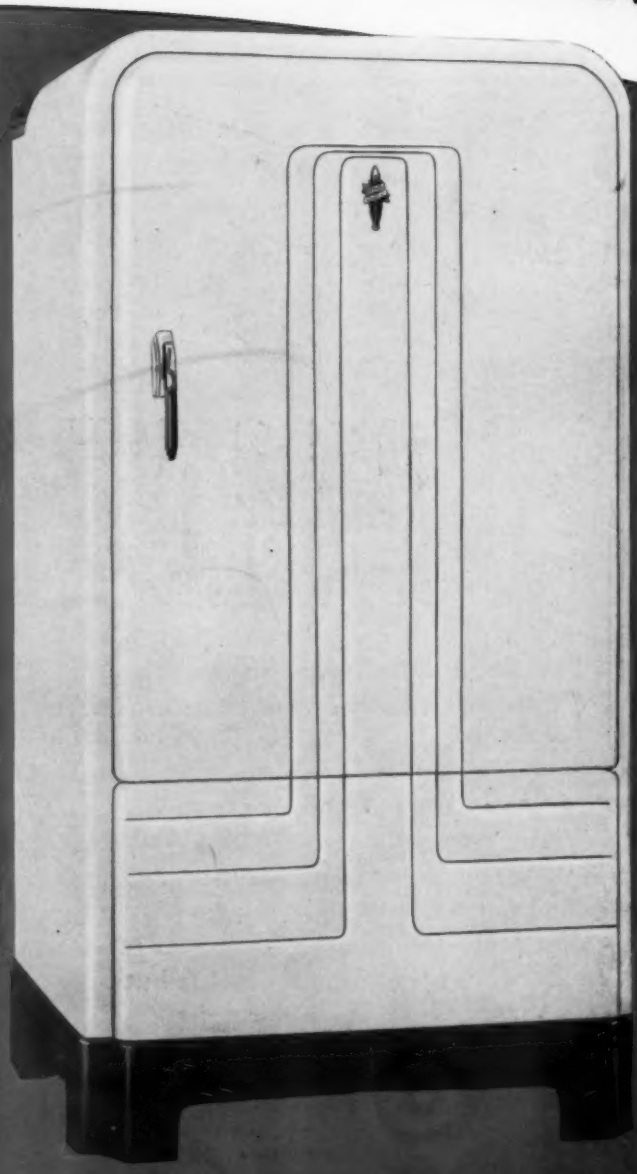

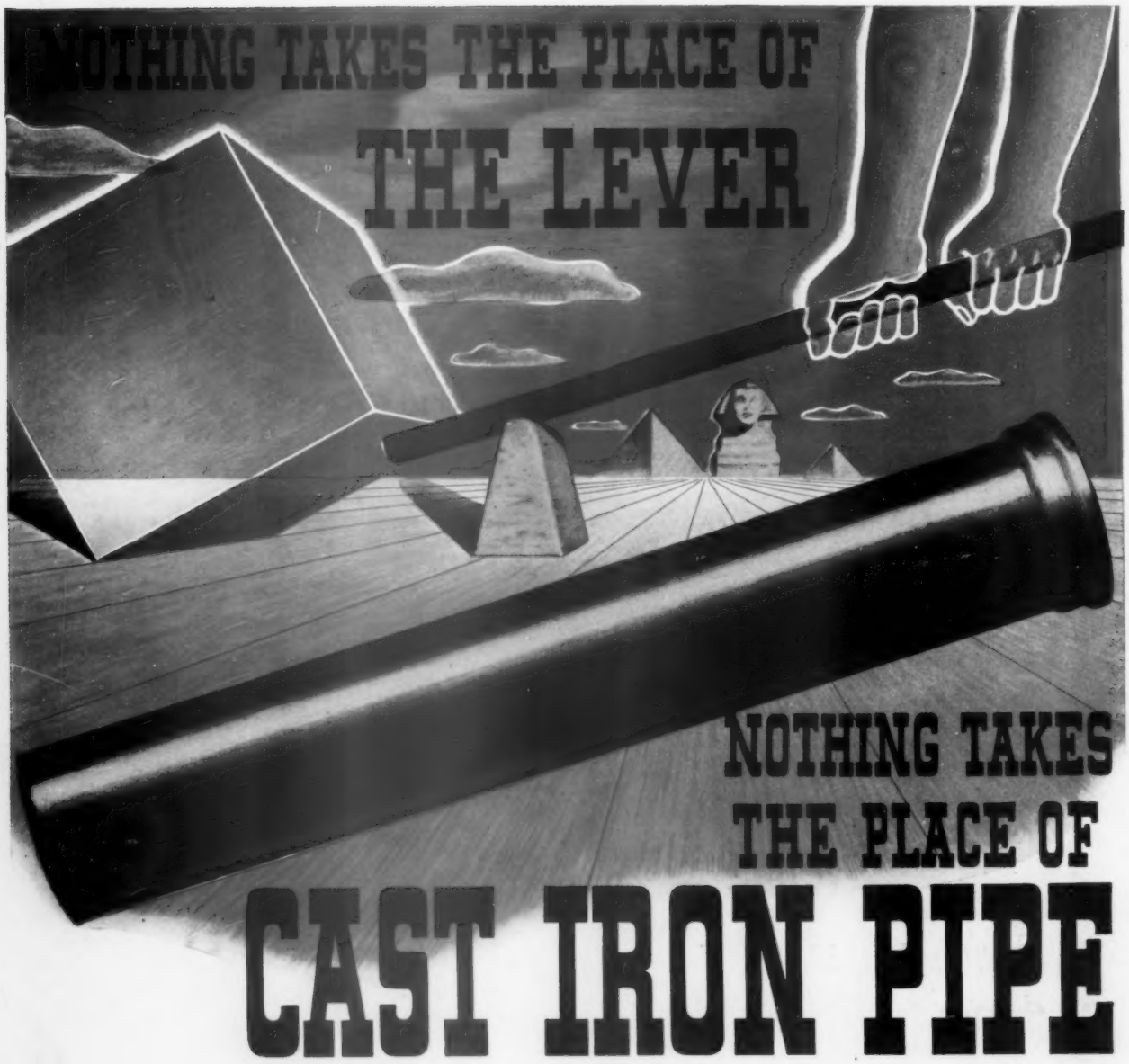

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JANUARY
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JANUARY, 1939

The Journal extends to its Readers and Advertisers best wishes for A Happy and Prosperous New Year

The Federal Power Commission and the Gas Industry

by
Chester J. Gerkin
Attorney at Law
Washington, D. C.

THE Natural Gas Act (approved June 21, 1938) placed a large part of the property and operations of the natural gas industry under the regulatory control of the Federal Power Commission. This Commission was established in 1920 to administer the Federal Water Power Act (41 Stat. 1063, 16 U.S.C.A. section 791). Its original membership consisted of three cabinet officers (ex-officio)—the Secretaries of Agriculture, Interior, and War. By Act approved June 30, 1930 the Commission was reorganized and five salaried, full-time commissionerships created. Its powers and duties were greatly enlarged by the Federal Power Act (enacted August 26, 1935, 49 Stat. 847, 16 U.S.C.A. section 791 (a)). This statute gave the Federal Power Commission jurisdiction over the interstate activities of electric utilities. Its functions were again substantially increased by the passage of the Natural Gas Act this year.

The Commission now has a staff of about four hundred in its main office, and maintains regional offices in five cities—Atlanta, New York, Chicago, Denver, and San Francisco. It has four bureaus—Administration; Accounts, Finance and Rates; Engineering; and Law. In their recent book on "Public Utility Regulation" (1938) Wilson, Herring and Eutsler say (page 411):

"The Federal Power Commission has been strengthened and is now receiving the administration support necessary to permit it to function as an effective regulatory agency."

Because of the marked difference in the Commission's duties under the Federal Water Power Act and the more recent Federal Power and Natural Gas statutes, we need not here review its work in the development of the nation's water power resources during the past eighteen years. Certain valuation proceedings under the earlier legislation may be of some interest (Clarion River Power Co. v. Smith 59 F. (2d) 861, P.U.R. 1932 E, 149; Louisville-Hydro-Electric Company, 1 P.U.R. (N.S.) 454; Alabama Power Co. v. McNinch, 94 F. (2d) 601), although, as already noted, the governing statutory provisions in the Water Power and the later Power and Gas acts are dissimilar. Referring to the Alabama Power Company case (wherein the Court considered the principles followed by the Commission in determining the actual legiti-

mate cost of a licensed project) in its 1936 Annual Report the Commission said:

"By reason of the difference between the general body of law relating to the valuation of public utilities and the standards applicable to licensed projects set forth in the Federal Water Power Act, now Part I of the Federal Power Act, this case is of considerable importance."

The Commission's work under the Federal Power Act has furnished it some utility experience and background for its new duties in the natural gas field. While the Power and Gas acts are by no means parallel statutes and there are marked differences between the operations of electric and natural gas utilities, the Commission's regulatory record in the electric field should be of interest to those engaged in the natural gas business.

During the three years the Federal Power Act has been in force the Commission has had but few formal proceedings involving electric rates, having dealt chiefly with the sale and lease of property; the cost of licensed projects; rate survey (examination and analysis of rate schedules and contracts filed); study of the division of the country into regional districts for the voluntary interconnection and coordination of facilities for the generation, transmission and sale of electric energy; the interlocking directorate problem, and simplification of corporate structures; service company charges; and the establishment of a uniform system of accounts, a list of "units of property," and form of annual report for electric utilities. Within this period it has also made a detailed study of and approved wholesale rates for the Bonneville Dam project, and has done research work in rates, markets, costs, rate of return, depreciation, maintenance, and related subjects.

The principal purposes of the Natural Gas Act are (1) the securing of reasonable, non-discriminatory rates for the transportation and sale of gas, and (2) the conservation or proper utilization of this important natural resource. In carrying out these main objectives some analogies will be found in and useful knowledge derived from contact with and study of interstate electric problems.

Section 206 (a) of the Federal Power Act and section 5 (a) of the Natural Gas Act are practically identical, each providing that whenever the Commission finds (after hearing) that any rate is unjust, unreasonable, unduly discriminatory or preferential, it shall determine and fix the proper rate. The Federal Power Commission has not yet handed down an opinion or entered an order in an electric rate case dealing in a comprehensive way with the valuation of property, operating expense items, or rate of return; and has adopted no regulations and made no rulings relative to methods of valuation or allowances of various charges in operating expenses. In its findings and final order in the Albany Lighting Company case (entered July 20, 1938) and reported in 25 P.U.R. (N.S.) 36) the Commission found that the "evidence of record in this case clearly establishes that a 6% return is adequate, fair and reasonable."

Few persons are better qualified than the author to discuss the control of gas companies by the Federal Power Commission under the Natural Gas Act. Mr. Gerkin is a member of the bar in Indiana, New York and the District of Columbia. For many years he was Resident Counsel for Columbia Gas and Electric Corporation and appeared for it in many natural gas rate cases, including: United Fuel Gas Company v. Public Service Commission of West Virginia, 278 U. S. 322; Central Kentucky Natural Gas Company v. Railroad Commission of Kentucky, 290 U. S. 264; Wright v. Central Kentucky Natural Gas Company, 297 U. S. 537, working with local counsel on the Lexington rate case from its inception in 1928 until its successful termination in 1936; Dayton Power & Light Company v. Public Utilities Commission of Ohio, 292 U. S. 290. Last year Mr. Gerkin resigned to enter private law practice in Washington, D. C., where much of his time has been spent in a study of the Natural Gas Act and in work connected with it. —Ed.

On December 3, 1938, the Commission entered an order dismissing without prejudice the complaint of a consumer of electric current in Philadelphia which alleged the utility was selling current to an affiliated company at less than the cost of production, thereby imposing an unjust burden upon other classes of consumers and confiscating its property. *J. Jerome Jaspan v. Philadelphia Electric Company.* At the conclusion of the hearing the defendant moved to dismiss the complaint on the ground that the Federal Power Commission lacked power to increase its rate for the sale at wholesale of electric energy in interstate commerce on a complaint of alleged discrimination against domestic consumers supplied current under rates fixed locally (intrastate rates). This motion was denied, but in its final order the Commission held it was without power or authority "to remove unjust discrimination which may be the result of rates charged by the Philadelphia Electric Company to its intrastate domestic consumers to which class of consumers the complainant belongs." The following observation appears in the opinion:

"The Commission recognizes the fact that it is manifestly impossible for an individual complainant to make out a prima facie case in a rate controversy such as that pending before the Commission in this proceeding. An individual complainant seldom, if ever, has the necessary funds to finance the investigation and prosecution of such a case. When it can be demonstrated by the complainant, or the Commission finds, as the result of a preliminary investigation, that there is reasonable justification or probable cause for the complaint and that the public interest will be served by prosecuting the necessary inquiry and investigation into the matters complained of, then the Commission will take all necessary action to determine and assemble relevant facts and information that may be required to enable it to consider and decide the issues presented by the complaint."

In its 1937 annual report the Commission discussed the "Prudent investment rule in rate-making." It said:

"Under the Federal Water Power Act of 1920 public utility companies securing license were required to consent to the use of net investment (the statutory equivalent for prudent investment) in the licensed project as a rate base in those situations in which the Commission could prescribe rates. The amendment of 1935 placing under the jurisdiction of the Commission interstate electric utilities did not expressly prescribe prudent investment as the base for rate-making purposes, but if the Supreme Court should approve as constitutional the theory of rate making for which the Commission is contending, the language of the amendment of 1935 would be sufficiently broad to enable the Commission to apply the prudent investment rule in fixing those rates which it is authorized to regulate."

As the Supreme Court has not sanctioned the exclusive use of investment (prudent or otherwise) in fixing the rate base, and the Natural Gas Act does not prescribe its use

as the sole criterion of "fair value," it is probable that the Commission will consider reproduction cost, market value, and other recognized factors or criteria for determining the fair value of property in fixing transportation rates and wholesale prices for gas. In *R. R. Commission v. Pacific Gas Co.*, 302 U.S. 388, the Court held that:

"Historical cost, as well as cost of reproduction, is admissible evidence of the value of a public utility's property." (Syllabus)

And in its recent opinion in Pacific Gas and Electric Co. v. Railroad Commission of California (decided September 8, 1938) a Federal three-judge Court, speaking through Circuit Judge Wilbur, said:

"The decisions of the Supreme Court are uniform to the effect that both these elements should be considered in arriving at the fair value of the property."

All students of the problem recognize that rate proceedings have been unnecessarily spun out in recent years, and that much time and expense could be saved and fair rates more promptly put into effect if commissions and courts hearing them insisted on greater expedition; and the attorneys, appraisers, and accountants for the parties cooperated better in an effort to get the pertinent facts into the record.[1]

The regulation of interstate transportation charges and city gate rates for natural gas is a new field. It does not conflict with state or municipal regulation, but supplements and implements these in an essential way. As stated by Hon. Alexander M. Mahood, member of the Public Service Commission of West Virginia and President of the National Association of Railroad and Utilities Commissioners, in an address before the 1938 annual meeting of the Natural Gas Department of the American Gas Association:

"Regulation of the natural gas industry is not susceptible of local state regulation alone. With long transmission lines transecting the nation it has become national in character and many of the problems can be solved only by a federal regulatory commission with powers to regulate the transmission of natural gas in interstate commerce."

In an article in Public Utilities Fortnightly (issue of October 13, 1938) Chairman Seavey of the Federal Power Commission said the Natural Gas Act

"x x x was a logical development, merely extending to natural gas companies engaged in interstate commerce somewhat the same supervision that had been exercised over electric and transportation utilities.

"x x x No one contended, as has been the case in most efforts to extend Federal regulation, that the bill was any 'invasion' of the rights of states or localities. In fact, the demand for its enactment came principally from states and cities which found that their efforts in the control of rates were often thwarted by the lack of authority of their commissions and agencies over companies transporting gas from other states or the basic rates charged for such gas supplied for local distribution. Only the strong arm of the Federal government could reach into that 'twilight zone' in which companies controlling a large proportion of the nation's gas supply escaped regulation."

A prime requisite of effective regulation is that jurisdiction of the regulatory body be coextensive with the service to be regulated. Even if they had regulatory jurisdiction over the portion of an interstate pipeline within their geographical limits, the various State commissions viewing a segment of the whole property would be somewhat in the position of the blind men who touched different parts of the elephant (tusk, trunk, leg) and obtained widely different impressions as to what the animal was like. Advocates of local regulation can make no stronger case for attempting to regulate interstate gas and electric operations than for local control of interstate railroad and motor carriers.

Even before Congress occupied the field by the passage of the Natural Gas Act it was settled law that State agencies were without power to fix the city gate rates or wholesale prices for gas sold by interstate pipelines. *Missouri v. Kansas Natural Gas Co.*, 265 U.S. 298. Since over half of the natural gas sold by public utilities moves in interstate commerce, and control of the transportation facilities by which a commodity is marketed gives practical control of the market so far as the supply is concerned, obviously if there is to be any real regulation of most natural and mixed gas rates it must be done by a federal agency. It seems clear that the regulation of this large and important part of natural gas operations by a single commission must result in greater economy and efficiency in the conduct of the business.

The regulatory work of the Federal commission should materially lessen that of over-burdened State commissions, expedite and reduce the cost of rate proceedings, and supply added impetus to the early introduction of natural gas into sections not now served with this splendid fuel. Nation-wide uniformity in regulation will aid in the sound development of our natural gas resources with beneficial effects upon the economic and social life of the communities served.

Natural gas is not only used as a fuel for cooking, space heating, and in various manufacturing operations, but furnishes gasoline, supplies carbon black for filler in automotive tires, and is an important raw material for chemical products. The American Petroleum Institute recently announced that one of the large chemical companies plans to build a four million dollar plant to make alcohol and other useful products from natural gas. The use of certain hydrocarbons or constituent elements of natural gas for manufactured products does not prevent the residue from being used as a fuel, and the proper utilization of this natural resource presents an important managerial and regulatory problem.

The specific duty imposed upon the Federal Power Commission in connection with the *conservation* of natural gas is that of assembling information and making reports to Congress on proposed State compacts dealing with its production, transportation, and distribution. The data it gathers will be available to the State authorities and the industry as well. Its work in this field ought to be of much benefit to the natural gas companies and the public.

In an interesting address on "Conservation of Natural Gas" before the Section of Mineral Law of the American Bar Association on August 25, 1936, C. C. Small, Esq. of Amarillo, Texas, said:

"Natural gas is taking the place of manufactured gas at a very rapid rate. By way of comparison we may say that natural gas is twice as rich in heat producing properties as manufactured gas, but when sold it yields the distributor only one-fourth as much revenue. This shows the advantage obtained by the consumer in using natural instead of artificial gas. The country is using five times as much natural gas for light and fuel purposes today as it did in 1906. More than seven million people in the United States now depend upon natural gas for domestic fuel, and it is being used as domestic fuel in 35 of the 48 states of the Union. The total trunk gas pipe line mileage is in excess of 52,000 miles, most of which has been installed since 1925. Up to date the peak consumption of natural gas came in 1935, when the country used more than 1,943,000,000 thousand cubic feet. The value of this gas was in excess of $413,000,000.

"From my study of the gas situation, I have concluded that up to date far more natural gas has been wasted than

[1] *For some suggestions looking to the accomplishment of this desideratum, see the writer's article on "How to Shorten Rate Procedure" in the January 30, 1936 issue of Public Utilities Fortnightly (volume 17, page 177).*

has been utilized for beneficial purposes. This fact, taken in connection with the vast investments made in gas producing acreage, pipe lines and distribution systems, the substantial earnings from royalty interests in producing properties, and lastly the convenience and utility of this valuable resource, is sufficient to make our people conscious of the need for the enforcement of stringent conservation laws from one side of the United States to the other. Natural gas is a highly important item in the nation's fuel supply, and it should be useless to further emphasize the fact that its conservation is in the public interest. With this in mind we find that the greatest asset of the Natural Gas Industry is the rich gas reserves that underlie fields to which pipe lines are connected and on which it relies for the amortization of the tremendous investments made in the physical properties. Without conservation these reserves will be destroyed and the investments made for distribution as well as for production will be lost. Consequently, we may say that conservation is essential to the protection of the public interest as well as for the protection of private rights."

The efforts in the field of natural gas conservation should not, in my opinion, be directed to limiting its use or saving it for future generations (which may or may not find it useful in competition with other fuels or forms of heat); but rather to the proper development of existing and newly discovered fields and the prevention of waste. It is well-known that much unnecessary drilling expense is incurred by the natural gas industry, and additional losses sustained by reason of methods employed in the utilization of this product. The Department of Interior compels the unitization of government lands under its supervision as a condition of their lease for oil and gas development.

The kinds or types of proceedings thus far instituted under the Natural Gas Act deal with rates (for the *transportation* and *sale* of gas), the exportation of gas to foreign countries, the importation of gas from a foreign country, and certificates of convenience and necessity to build pipelines. [Seventeen proceedings had been filed as of December 20, 1938. Eight of these are *rate* cases, six are *export* cases, one an *import* case, and two applications for *certificates of convenience and necessity*.]

The first rate proceeding was filed July 6, 1938, by the City of Cleveland, Ohio, against the Hope Natural Gas Company, and asked the commission to fix the fair and proper rate for the Hope company (which produces and purchases gas in West Virginia and transports it to the Ohio River—the state line) to charge the East Ohio Gas Company (an affiliated company) for such natural gas. By subsequent petition the City of Cleveland asks the Commission to determine the cost to the East Ohio company of transporting this purchased gas from the Ohio River to the city gate. The second rate case was instituted by the City of Akron, Ohio, against the Hope Natural Gas Company and also involved the propriety of the price charged the East Ohio for gas delivered at the Ohio River. On October 14, 1938, the Federal Power Commission (on its own motion) entered an order instituting an investigation to determine whether the rates, contracts, classifications, and practices of the Hope company relating to the sale of natural gas in interstate commerce were reasonable and lawful; also, whether the purchase prices it paid other producers of gas were reasonable. The company has filed answer to the complaints of the cities of Cleveland and Akron, but hearing date has not yet been fixed for these proceedings.

The Illinois Commerce Commission on September 23, 1938 filed a petition with the Federal Power Commission asking it to direct the Natural Gas Pipeline Company of America to show cause why the rates it charged the Chicago District Pipeline Company and other utilities in Illinois should not be reduced. On its own motion the Federal Power Commission entered an order October 14 instituting an investigation of the rates, contracts, practices, classifications, etc., of the Natural Gas Pipeline Company of America and the Texoma Natural Gas Company. (The latter company owns the portion of the pipeline between Fritch, Texas and Gray, Oklahoma.)

On October 6, 1938 the Federal Power Commission suspended the taking effect of a rate schedule filed by the Arkansas - Louisiana Gas Company for increase in the wholesale rate or price charged the Camden Gas Corporation (which serves the City of Camden, Arkansas) and entered upon an investigation of the proposed rate. The commission set this case for hearing on November 10, but at the request of the company postponed the hearing date to February 10, 1939. The Camden Gas Corporation (distribution company) filed protest against the new rate schedule.

The Capital Gas Corporation, Montana-Dakota Utilities Company on September 7 asking the Commission to fix just and reasonable rates for the transportation of natural gas in interstate commerce, and to require the defendant to accept and transport natural gas through its pipe lines to complainants' consumers under reasonable rules and regulations.

The Public Service Commission of New York filed complaint against the New York State Natural Gas Corporation on November 28, 1938, alleging that the rates charged for natural gas sold to the distribution company at Syracuse (transported from Pennsylvania) were too high—and the sale price to industrial users discriminatory as to domestic consumers.

Applications for authority to *export* gas to Mexico and Canada have been filed with the Commission, as follows:

United Gas Pipe Line Company from a point near Roma, Texas to Monterrey, Mexico.

United Gas Corporation from Laredo, Texas to Nuevo Laredo, Mexico.

El Paso Natural Gas Company from a point near Naco, Arizona to Cananea, Mexico; and from El Paso, Texas to Juarez, Mexico.

Texas Cities Gas Company from El Paso, Texas to Juarez, Mexico.

Texas Gas Utilities Company from Eagle Pass, Texas, to Piedras Negras, Mexico.

Iroquois Gas Corporation from near Buffalo, New York to the village of Fort Erie, Ontario, Canada.

Application to *import* gas from the province of Alberta, Canada, into Montana was filed by the Montana-Dakota Utilities Company on November 18, 1938.

On December 20, 1938, the Commission entered orders granting authorization to all these applicants for a period of ninety days (section 3 of the Natural Gas Act became effective December 21).

The following applications for *certificates of convenience and necessity* have been filed with the Federal Power Commission.

1. Kansas Pipe Line and Gas Company to construct a natural gas pipeline from the Hugoton field in southwestern Kansas to the Mesaba Iron Range in Minnesota, and lateral lines to 129 communities in Kansas, Nebraska, South Dakota, North Dakota, and Minnesota.

2. Public Service Gas Company to build a pipeline from gas fields in Montana and Wyoming to Minneapolis and St. Paul, Minnesota.

The National Bituminous Coal Commission, the National Coal Association, The United Mine Workers of America, The Maher Coal Bureau, The Northwestern Retail

Coal Dealers Association, and Truax Traer Coal Company filed petitions to intervene in the Kansas Pipe Line and Gas Company proceeding. The Commission heard oral argument on the issue of the right of these several petitioners to intervene on October 21. The coal interests appeared in opposition to the pipeline company's application.

The National Coal Association, Truax Traer Coal Company, and The Maher Coal Bureau have also filed petitions to intervene in the Public Service Gas Company case.

Since the territory or markets intended to be served by the Kansas Pipe Line and Gas Company are now without natural gas the applicant contends it is not required to secure a certificate of convenience and necessity (section 7 (c) of the Natural Gas Act), and asks the commission to disclaim jurisdiction in the premises. However, in the event the commission has jurisdiction to pass upon the applicant's right to a certificate it does not follow that the coal interests may intervene in the proceeding. The procedural question raised appears to be novel and is of first impression under the Natural Gas Act.

Without expressing any opinion regarding the legal right of a government agency charged with certain regulatory duties over an industry to appear as its advocate in litigation or controversies with industries furnishing a competing service, it may be observed that such action is unusual if not unprecedented; furthermore, that if such practice obtained there would be occasion for questioning the propriety of subjecting competing service industries to the regulation of a single agency: as, for example, the railroad and motor carriers under the Interstate Commerce Commission; and the electric and natural gas companies under the Federal Power Commission.

Competition is an effective aid in regulation, as also in bringing about improved service, and between products and forms of service supplying the same general need should ordinarily be permitted and encouraged. Professor Beverly Lake truly states that:

"Competition supplies an incentive for improvement, invention, efficiency, and attentive service that no commission can hope to supply."[2]

[2] *"Competition in the Public Utility Fields," 10 Mississippi Law Journal, 197-238 (April 1938).*

In an address on October 10, 1938 at the Annual Convention of the American Gas Association Chairman Seavey of the Federal Power Commission stated the Commission was giving consideration to prescribing a *uniform system of accounts* for natural gas companies. He said:

"It is of the utmost importance that natural gas companies which are subject to the jurisdiction of a State regulatory commission for some purposes, and subject to the jurisdiction of a Federal regulatory commission for other purposes, should not be required to keep separate systems of accounts in order to meet the requirements of the respective regulatory agencies. The Federal Power Commission in prescribing a system of accounts for electric utilities worked in close collaboration with representatives of the various State regulatory agencies. The uniform system of accounts formulated for electric utilities is now being used, I think it is safe to say, by 90% of the electric industry.

"We are attempting to follow the same procedure in compiling a system of accounts for natural gas companies. In fact, even before the enactment of the Natural Gas Act, representatives of the Federal Power Commission had for some time been in consultation with the Committee on Statistics and Accounts of the National Association of Railroad and Utilities Commissioners concerning the drafting of a uniform system of accounts for natural gas companies. It is to be hoped that within the reasonably near future, the same high degree of uniformity in the keeping of accounts will prevail in the natural gas industry as now exists in the electric industry."

The Committee on Statistics and Accounts of Public Utility Companies presented a revised draft of the uniform system of accounts for gas utilities (submitted in 1936) to the Annual Meeting of the National Association of Railroad and Utilities Commissioners held in New Orleans November 15-18, 1938. This revision incorporated changes, making the proposed classification applicable to natural gas companies. The Association adopted a resolution reading, in part, as follows:

"*Resolved*, That the revisions of the Association's uniform system of accounts for gas utilities, prepared by its Committee on Statistics and Accounts of Public Utility Companies, be recommended to the commissions represented in the membership of this Association for consideration and for adoption in their respective jurisdictions."

The Federal Power Commission has made no announcement relative to the adoption of a uniform system of accounts for gas companies under its jurisdiction. It is expected that the Federal and State Commissions having to deal with natural gas will adopt substantially similar systems of its accounts as it is generally agreed that uniformity in utility accounting is in the public interest.

No formal decisions relating to its jurisdiction and powers under the Natural Gas Act have yet been entered by the Federal Power Commission. But its duties with respect to the natural gas industry are clearly set forth in easily understood statutory provisions. With proper cooperation between the gas companies and the federal and local regulatory bodies reasonably prompt and satisfactory solutions of the problems now facing the industry should be found.

American Standards Association Meets

William L. Batt, president of SKF Industries and president of the International Management Conference, was guest speaker at the Annual Meeting of the American Standards Association held at the Hotel Astor, New York. This meeting marked the twentieth year of the American Standards Association's activities as national clearing-house for the standardization work of American industry, including health and safety codes.

Dana D. Barnum, retiring president of the Association called attention to the 14 active projects in the building field, to the beginnings of work for the prevention of occupational diseases, and to the newly organized Highway Traffic Standards Committee which is bringing together 17 national organizations and government groups interested in safety standards for traffic.

"Twenty years ago this October," Mr. Barnum pointed out, "the American Standards Association was organized by industry for a definite purpose. It has today reached a point where it is providing services which industry cannot do without.

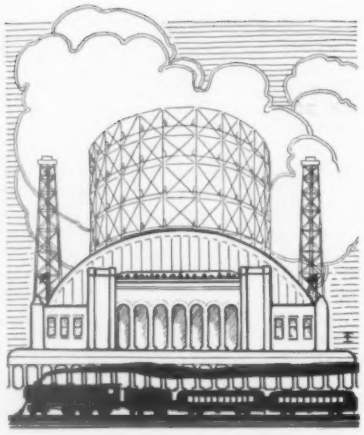
"We have twenty years of successful operation to our credit; we have methods that are tried and found good; we have acknowledgment by industry of the worth of the work; we have the confidence of industrial executives, regulatory bodies and enforcement officers who have used the standards and safety codes."

The Gas Industry in 1938

THE year 1938 was one of continued progress and expansion for the gas companies in the United States, according to Conrad N. Lauer, President of the American Gas Association.

Manufactured and natural gas companies, supplying towns and cities with a population of 81,000,000, served a total of 17,135,000 customers, representing the largest number of consumers ever connected to the mains of the industry, and an increase of 180,000 over the year 1937. Of these, 9,988,000 were served by the manufactured gas industry and the remaining 7,147,000 were served by the natural gas industry. Preliminary estimates indicate that revenues of the entire industry, both manufactured and natural, aggregated $786,576,000 in 1938, a decrease of 1.8% from the preceding year. The manufactured gas companies grossed $367,714,000, a gain of 2.2% for the year, while revenues of the natural gas companies were $418,862,000 as compared with $441,232,000 in 1937, a decrease of 5.1%.

Sales of manufactured gas for domestic uses, other than house heating, such as cooking, refrigeration, water heating, etc., amounted to 198,331,000,000 cubic feet, an increase of 1.5% for the year. The gain in house heating sales amounted to 10%. This would doubtless have been larger except for the mild temperatures that prevailed throughout the year in most sections of the country. The number of degree days (the gas industry's standard measure of weather conditions) for a number of the larger cities served with manufactured gas, averaged only 3,496 for the first ten months of 1938, or 10.3% less than the figure of 3,897 reported for the corresponding period in 1937. For somewhat the same reason, the sales of natural gas for domestic uses, which are influenced to a considerable extent by temperature variations, registered a decrease, falling from 359,294,000,000 cubic feet in 1937 to 350,143,000,000 cubic feet in 1938, a loss of 2.5%. For a group of the



larger cities served with natural gas, the number of degree days for the first ten months of 1938 averaged only 2,609 or 15.5% less than the 3,088 degree days registered for these cities during the corresponding period of 1937. Sales of manufactured gas for industrial and commercial purposes in 1938, a year of marked industrial recession, were about 1% above the previous year, while industrial sales of natural gas declined 15%.

Preliminary estimates indicate that the total production of natural gas in 1938, including amounts used in the manufacture of carbon black and for field purposes, reached an all-time high of more than two and one-half trillion cubic feet, or more than 2 per cent above the previous peak established in 1937. Approximately 173 billion cubic feet of natural gas were used as fuel for generating electric power in 1938. This was an increase of nearly 2% over the previous year.

The sales promotional efforts of the industry toward stimulating the residential use of gas have continued to show a rapid growth. National campaigns on gas ranges, water heaters and refrigerators, tied in with the National Advertising Campaign of the industry, have quickened public appreciation of the value of domestic gas service for the major needs of the home.

During 1938 the industry inaugurated a program for the design, production and sales promotion of a new type domestic gas range with Certified Performance Requirements and adopted a special trade mark for ranges complying with these quality specifications.

More than sixteen range manufacturers are now producing ranges of this type and the number is growing rapidly.

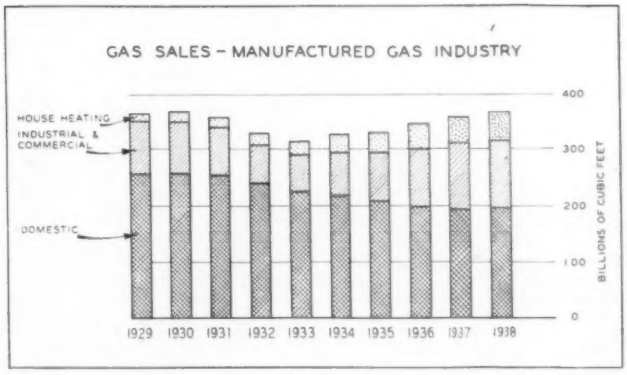
More than one million gas ranges were sold during 1938 and the industry anticipates increased sales during 1939, with greater emphasis upon these quality cooking appliances.

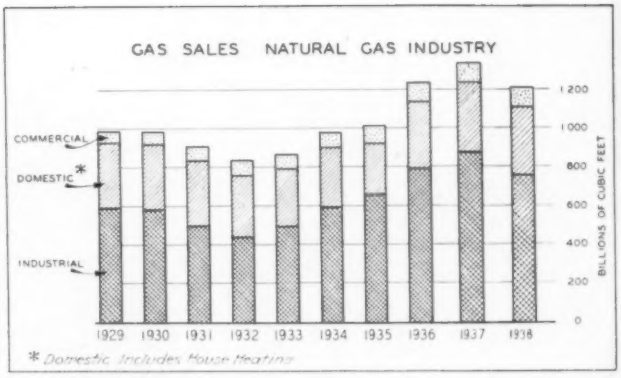
Gas refrigeration continued to advance its achievements of previous years by again making a better relative sales showing than other types of automatic domestic refrigerators during 1938.

The past two years have been characterized by an increasing appreciation of the great potential market for domestic water heating. There has been a widespread adoption of rates more favorable to the use of gas for this purpose. This has been accompanied by a marked acceleration of local sales effort and a nation-wide coordinated campaign to promote the use of gas for water heating, with the result that more than 680,000 gas water heaters were sold during 1938, and even better results are anticipated from the program of sales promotional efforts to be continued during 1939.

Gas companies have continued to inaugurate more favorable rates for house heating through central plant burners and equipment. It is estimated that the total number of gas central house heating installations connected to the lines of all United States gas companies in 1938 amounted to 825,000. In addition there were approximately 1,400,000 dwellings heated by unit heaters, space heaters, floor furnaces, etc., giving a total of more than 2,225,000 homes in the United States that are heated by gas.

The American Gas Association All-Gas Home Program includes an architectural competition for the de-





sign of All-Gas Homes, a builders' competition for the actual construction of All-Gas Homes, and the All-Gas Home Demonstration Program. This program, inaugurated at a time when the subject of housing is being highly publicized and when building is becoming increasingly active will play an important part in assuring the increased use of gas and gas burning appliances in new and modernized homes during 1939.

The first part of the program—the architect's competition—closed on May 23, 1938, and was an outstanding success. Over 5,000 of the most prominent architects and designers in the United States and the Dominion of Canada registered in this competition and the hundreds of designs of All-Gas Homes, including separate designs of all-gas kitchens and basements or utility rooms, were highly publicized. Each of the competitors was furnished with definite information and specifications on gas appliances which should result in the increased selection of gas and gas appliances in their future planning and specification activities.

The second part of the program—the builders' competition—for the actual construction of All-Gas Homes is progressing rapidly, with over 1,400 builders from all parts of the country officially registered in the competition. This contest is open to any builder in the United States or Canada who builds or modernizes a home using gas for the four big jobs from July 1, 1937, to July 31, 1939.

The All-Gas Demonstration Program for All-Gas Homes sponsored by the local utility company is progressing apace with demonstration homes having been built in 16 cities and viewed by several hundred thousand persons. Reports indicate that a considerable number of demonstration homes are planned for construction in the Spring of 1939.

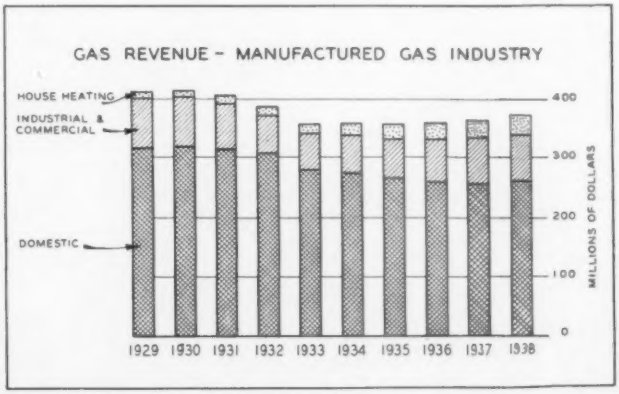
The success of recent national cooperative sales campaigns, sponsored jointly by the gas utilities and the gas appliance manufacturers, has led to more aggressive campaign plans on the four principal domestic uses of gas—cooking, refrigeration, water heating and home heating during 1939. Closer coordination is being accomplished between these new campaigns and the industry's National Advertising Program, as well as the national sales programs of the individual gas appliance manufacturers.

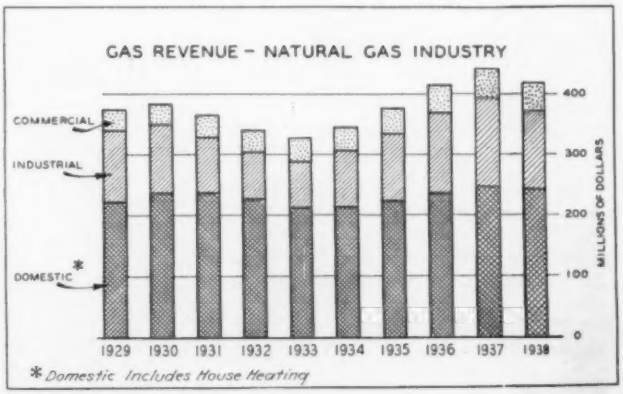
The growth of acceptance of these national movements by gas companies insures their more effective use locally. Under the influence of all these factors, it is anticipated that the average annual consumption of gas per residential customer will assume substantially higher levels during the next few years, without considering the marked increases in the sale of gas for home heating.

The sale of non-residential gas for various industrial and commercial applications has increased steadily in recent years. The value of a clean flexible fuel that can be burned and controlled automatically within close limits is more fully recognized now than formerly. From a technical standpoint industrial gas is penetrating new heating operations each year. For instance, industrial summer air conditioning by gas has been found to have certain qualities that are especially applicable to manufacturing operations in such fields as pharmaceutical, safety glass, fish drying, high grade printing, film manufacture and chemical production. Gas summer air conditioning has also been successfully applied to large stores, shops, offices, theatres, etc.

The use of gas engines in certain natural gas territories is growing steadily. The economy and flexibility of power generated in this manner appeals to many users.

Demonstrating its confidence in the business future, the Association's Executive Board, nine months in advance of the termination of the gas industry's three-year $1,500,000 campaign of national cooperative advertising, approved a three-year extension of this campaign, starting with July, 1939. A movement is





now underway to increase by 50% the advertising budget for the new three-year term.

Financed by 708 operating gas and gas and electric companies, the campaign has brought about a larger volume of national advertising by gas appliance manufacturers and has materially increased both the quantity and quality of local company and dealer newspaper advertising, including many special newspaper sections devoted exclusively to the promotion of the latest models of gas appliances.

With more than 2,000,000 copies of the Mystery Chef recipe book called for in person at the offices of Eastern and Pacific Coast companies, the radio program which offers this book in connection with practical talks on gas cooking and home making is now being suggested for extension on coast-to-coast network facilities for 1939-40.

The gas industry will be appropriately represented at the New York 1939 World's Fair and the Golden Gate International Exposition. The industry will have its own building and exhibit at the New York Fair and one of the outstanding features will be the largest and most spectacular gas flame ever created by man. The building is 90% completed. Companies on the Pacific Coast are sponsoring an exhibit occupying some 10,000 square feet of space at the Golden Gate Fair. Gas fuel and gas appliances are being used almost exclusively in both expositions for heating, cooking, water heating and for special street lighting and pyrotechnics. To insure adequate gas service at the New York Fair, the distribution system has been set up to handle a maximum hourly demand for gas fuel more than four times as much as that required for the Century of Progress Exposition in Chicago during 1933-34.

Preliminary Estimates on the Gas Industry for 1938

CUSTOMERS	*1938*	*1937*	*Per Cent Change*
Domestic (Incl. House Heating) ..	16,115,000	15,943,000	+ 1.1
Industrial and Commercial	1,020,000	1,012,000	+ 0.8
Total	17,135,000	16,955,000	+ 1.1
GAS SALES (MCF)			
Domestic (Incl. House Heating) ..	598,638,000	600,294,000	— 0.3
Industrial and Commercial	964,160,000	1,064,762,000	— 9.4
Total	1,562,798,000	1,665,056,000	— 6.1
REVENUE (Dollars)			
Domestic (Incl. House Heating) ..	536,990,000	531,938,000	+ 0.9
Industrial and Commercial	249,586,000	269,259,000	— 7.3
Total	786,576,000	801,197,000	— 1.8

Statistical Department American Gas Association

Preliminary Estimates on the Manufactured Gas Industry for 1938

CUSTOMERS	*1938*	*1937*	*Per Cent Change*
Domestic	9,289,000	9,276,000	+ 0.1
House Heating	230,000	202,000	+13.9
Industrial and Commercial	460,000	462,000	— 0.4
Miscellaneous	9,000	9,000	—
Total	9,988,000	9,949,000	+ 0.4
GAS SALES (MCF)			
Domestic	198,331,000	195,400,000	+ 1.5
House Heating	50,164,000	45,600,000	+10.0
Industrial and Commercial	108,507,000	107,433,000	+ 1.0
Miscellaneous	2,243,000	2,130,000	—
Total	359,245,000	350,563,000	+ 2.5
REVENUE (Dollars)			
Domestic	260,963,000	256,853,000	+ 1.6
House Heating	31,964,000	28,539,000	+12.0
Industrial and Commercial	73,242,000	73,093,000	+ 0.2
Miscellaneous	1,545,000	1,480,000	—
Total	367,714,000	359,965,000	+ 2.2

Statistical Department American Gas Association

Preliminary Estimates on the Natural Gas Industry for 1938

CUSTOMERS	*1938*	*1937*	*Per Cent Change*
Domestic (Incl. House Heating) ..	6,596,000	6,465,000	+ 2.0
Commercial	510,000	501,000	+ 1.8
Industrial	41,000	40,000	+ 2.5
Total	7,147,000	7,006,000	+ 2.0
GAS SALES (MCF)			
Domestic (Incl. House Heating) ..	350,143,000	359,294,000	— 2.5
Commercial	99,459,000	102,654,000	— 3.1
Industrial	581,451,000	681,978,000	—14.7
Electric Generation	172,500,000	170,567,000	+ 1.1
Total Ind. & Elec. Generation	753,951,000	852,545,000	—11.6
Total	1,203,553,000	1,314,493,000	— 8.4
REVENUE (Dollars)			
Domestic (Incl. House Heating) ..	244,063,000	246,546,000	— 1.0
Commercial	47,381,000	48,152,000	— 1.6
Industrial & Elec. Generation	127,418,000	146,534,000	—13.0
Total	418,862,000	441,232,000	— 5.1

Statistical Department American Gas Association

A.G.A.E.M. Appoints Program Committee

E. R. Guyer, of Chicago, president of the Association of Gas Appliance and Equipment Manufacturers, has appointed a Program Committee to draw up plans for the Association's annual convention to be held at the Roosevelt Hotel, New York, May 24 to 26 (1939). Lucian Kahn, of the Estate Stove Co., Hamilton, Ohio, has been named chairman of the Committee.

Serving on this planning group are: F. E. Sellman, of New York, vice-president of Servel, Inc.; E. C. Adams, president, Adams Brothers Manufacturing Co., Pittsburgh; T. T. Arden, sales manager, Milwaukee Gas Specialty Co., Milwaukee, Wisc.; R. L. Clewell, of the National Radiator Corp., Montclair, N. J.; J. Scott Fowler, president, Lovekin Water Heater Co., Philadelphia; Philip S. Harper, president, Harper-Wyman Manufacturing Co., Chicago; Merrill N. Davis, executive vice-president, S. R. Dresser Manufacturing Co., Bradford, Pa.; W. P. Hutchinson, president, Sprague Meter Co., Bridgeport, Conn.; W. P. Smith, vice-president, Continental Water Heater Co., Los Angeles, Cal.

San Francisco Selected for Executive Conference

The Executive Board of the American Gas Association has selected San Francisco as the meeting place of the Association's executive conference, according to announcement made by the Association from its headquarters in New York. The conference dates have not been determined except that they will be around the middle of May. Delegates who attend the conference will have an opportunity to visit the Golden Gate International Exposition.

New Gas Equipment and Public Relations

by
George H. Snyder
Pittsburgh Pa.

IN a discussion of the public relations position of the General Motors Corporation, Paul Willard Garrett expressed a thought which might well be applied to the gas industry. Mr. Garrett said:

"Every day more than 28,000,000 General Motors people are casting a vote for or against us in a sort of informal nation-wide poll with their friends. These 28,000,000 voters represent our own organization — employees — stockholders — dealers — suppliers — product owners — together with their families. All of these have had some kind of contact with us, and because of this — their judgment of us is accepted."

If we apply the same type of reasoning to the gas industry, we find there is a much bigger poll reflecting the general public attitude toward the companies supplying gas service, toward the kind of service they give, toward their methods of doing business, and toward the officers directing the destinies of these companies.

Last year the gas industry was serving over 17,000,000 customers in towns and cities with a population of 80,000,000, so that the continuous poll of public opinion, if we may call it such, represents a more than substantial majority of the nation's population.

Elaborating on this thought, we might assume that every daily contact which the individual has with his gas service shapes the national opinion in which the gas industry is held. This extends even beyond the obvious influences of the actions of municipal, state, and national governments toward the industry. It extends to a very definite competitive phase. Year by year the gas industry is becoming more conscious of the fact that the fields in which it is competing with other fuels and other forms of energy are increasing, and that this competition is growing more keen.

The average voter in our imaginary poll is not particularly conscious of his gas service while the equipment in his home, his shop, or his factory is working properly, but he becomes distinctly conscious of it when something fails to work. Rightly or wrongly, consciously or unconsciously, he is quite apt to cast a negative vote under such circumstances.

Blaw-Knox Gas Cleaners Beach Creek, Ky. Compressor Station, United Fuel Gas Co.

He very likely may think, "Jim has an electric refrigerator. He always has ice cubes," or "Chet has one of those new coal stokers. He has no trouble. I'd better look into that." At this point most gas men will object that gas equipment is freer from service complaints than competing equipment. But this very freedom from trouble and bother is a major factor in overcoming some of the disadvantages of gas so that it is highly important that the record of freedom from trouble be kept as clean as possible.

For many years gas engineers were justified in the opinion that nearly all companies have been supplying a product fully up to the standards which should be expected by the user. But these standards were those of a day when gas equipment both in industrial and residential use was simpler. Then nearly all of it was non-automatic in operation. The present trend, however, is toward increased use of highly developed automatic equipment which, however well designed, is far more subject than old equipment to the danger of going out of operation through such a difficulty as a pilot light stoppage.

Clean gas obviously is the answer to this type of service complaint, as well as to many others, and many gas engineers have been making studies to determine whether or not they are supplying a product which gives the user the maximum freedom from trouble which he expects.

They are recognizing the fact that the cost of service calls due to pilot outages from dust or gum is only a minor consideration in comparison to the dissatisfaction on the part of the consumer when a piece of equipment fails in operation.

The most common reasons for pilot light outages are dust in natural gas systems and dust or gums in manufactured gas systems. While the dust problem is most apparent to the consumer when his pilot light goes out, it is much more far reaching to the gas company.

In a discussion of this problem before a joint committee conference of the Production and Chemical committees of the American Gas Association in May, 1934, Louis Shnidman of the Rochester Gas and Electric Corporation said:

"The effects of dust in gas are becoming more and more apparent at the present time with the rapid increase and use of appliances that employ small openings through which the gas must pass. Distribution and transmission equipment as well as industrial and domestic appliances were illustrations of the materials that showed the effects of dust in gas. The consensus of opinion of the engineers in both the natural and manufactured gas fields was that

the gas should be free from dust particles within practical limits. There were several who were of the opinion that dust should be completely removed. All engineers agreed as to the harmful effects of dust in gas. They found that dust caused trouble in transmission lines, distribution mains, pumping equipment, compressors, regulators, meters, industrial equipment, filters, automatic appliances, and especially pilot lights. The answers from the men in the natural gas field were more positive and definite as to the harmful effects than those in the manufactured gas areas. It was interesting to note that dust accumulations were found in parts of the distribution system and equipment where the harmful effects were noticed. Engineers in both the natural and manufactured gas industries stated that dust accumulated most generally in meters and regulators in the distribution system, appliance orifices, compressor stations, transmission lines, district governors, dust traps, etc.

"The collection of dust in transmission lines and in distribution systems had a marked effect on the capacity of such systems. One engineer related how, as a result of internal corrosion produced by natural gas, the capacity of their transmission lines was reduced as much as 20 per cent.

"Shutting down of compressors for re-grinding and cleaning of valves as well as frequent replacement of rings and liners was reported by many engineers. Pumping equipment required inspection at frequent intervals, with repair or replacement of wornout parts, if continuous operation was desired.

"Pressure reducing regulator valves were eroded by the dust particles such that they would not function properly and at times not at all.

"Deposits were found in positive meters as well as on orifice meter plates. In the latter case, the deposit would build up to a sizable thickness, causing the meter to read incorrectly. Positive meters were found to build up with dust accumulations. One organization reported that they condemned most of their gas meters because of pits and corrosion in the valve enclosures resulting from rust and dust deposits. In other cases, accumulation of dust caused meters to run slow or cease to function entirely.

"Industrial equipment consuming gas had in many cases become clogged with dust, parts had been eroded, necessitating expensive repairs as well as frequent shut downs. Automatic appliances, especially for domestic use, had shown a rapid increase in complaints as a result of dust. Pilot lights, and small orifices where the gas passed, became clogged, necessitating service calls. Some organizations had provided dust filters for automatic appliances. In addition, fittings and burners would become clogged. This type of dust trouble was most harmful from the standpoint of losing the good-will of industrial and domestic consumers."

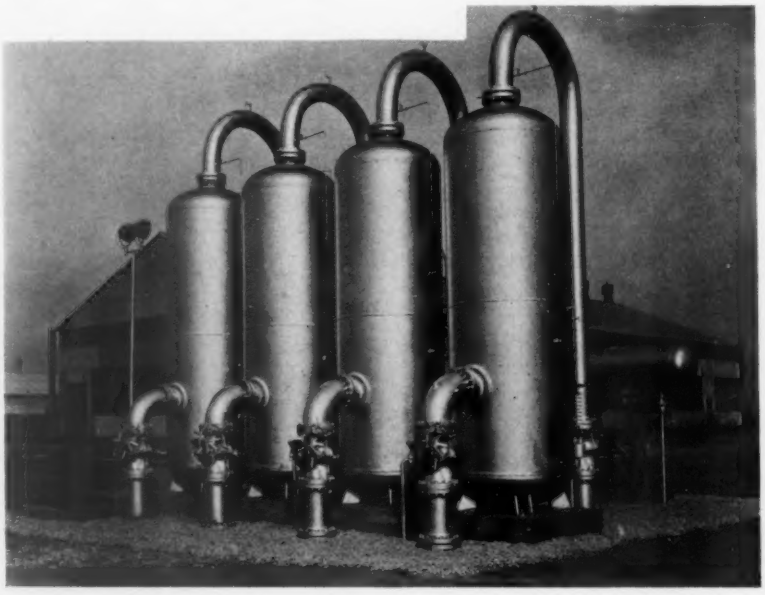
And especially pertinent to this are the remarks of H. B. Anderson, engineer of distribution of the Philadelphia Gas Works Company, in a paper read before the Annual Distribution Conference of the American Gas Association in 1935. He declared:

"To all gas men, to 'keep gas on the town' is a tradition; to fail so to do, a disgrace. Under present conditions in many companies, this is not enough. It must be amplified until we can 'keep gas on the appliance' with the same success that we keep it on the town. In Philadelphia, we are trying in every way we know how to make this an accomplished fact. Every interruption in service, because of a piping stoppage, a meter removal, an appliance defect, is a violation of this principle. Its effect may be of slight inconvenience to the customer, or it may mean a delayed meal, an omitted bath, or a cold. When this happens, our reputation is damaged and, perhaps, that of our competitor is enhanced. The customer is angry and remembers the incident to our disadvantage at a later date."

The causes of dust in transmission and distribution systems are fairly well known. The initial cause is principally corrosion. An excellent paper on this is that of Mr. M. T. Burton of the Southern California Gas Company which he presented before the Pacific Coast Gas Association in 1936.

A secondary cause of dust troubles arises from the transportation of dust by the flowing gas. Systems may be substantially free of the elements of corrosion but often experience dust troubles because dust has been transported into the system.

Practically all systems which have changed from the manufactured to natural gas also have encountered dust trouble as a result of the drying out of oily, aqueous, mineral or organic deposits left in the main during the period of manufactured gas distribution.

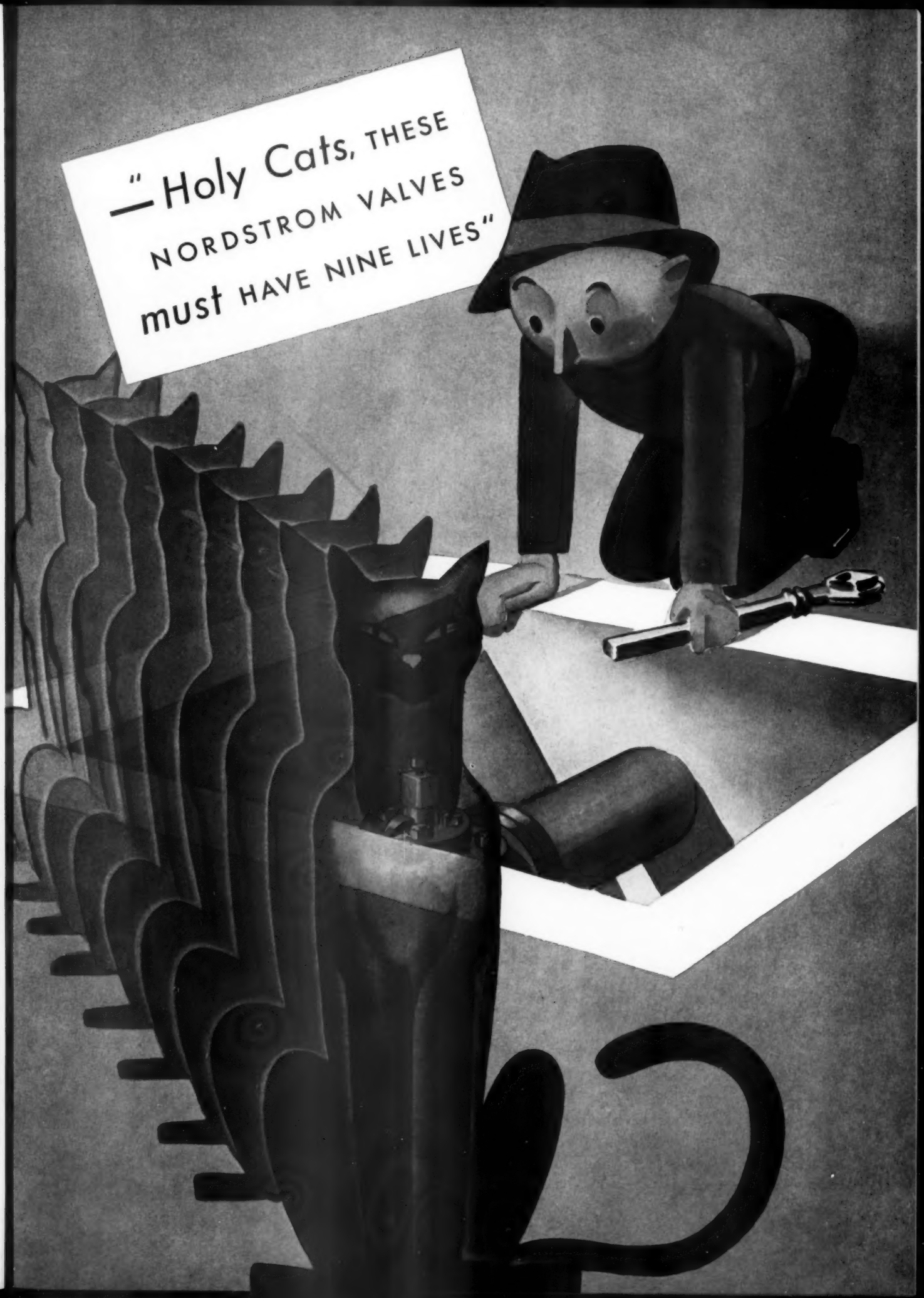


Blau-Knox Gas Cleaners at Haven, Kansas, Station of Panhandle Eastern Pipe Line Co.

The dust problem usually manifests itself during periods of the greatest movement of gas, which, in most systems, is in the Winter months, when maintenance of service is most important from the viewpoint of customer relations and monetary return.

Due to the fact that the sizes of dust particles reaching pilots and causing stoppage range from 0.0008 to 0.00002 inches, it is obvious that makeshift cleaning equipment can

(Concluded on page 52)


"Holy Cats, THESE
NORDSTROM VALVES
must HAVE NINE LIVES"

Nordstrom Valves and Emco Regulators on natural gas distribution lines.

They all say there's MULTIPLIED SERVICE *in* NORDSTROMS

Superintendent says:

"By way of summation I want to say that our Nordstrom Valves are *doing the hard jobs well*. I don't have to worry about leaks or other valve failures when away from the plant."

Chief Engineer says:

"Prior to installing Nordstrom Valves we estimated our valve repairs at about $5.00 per month per valve. Nordstroms, requiring practically no repairs, have greatly reduced this figure."

Production Manager says:

"We are operating with fewer line troubles than ever before, thanks to a policy of installing Nordstroms as replacements. Clogged valves and frequent difficulty of opening and closing ordinary valves are troubles non-existent where Nordstroms are used."

Plant Chemist says:

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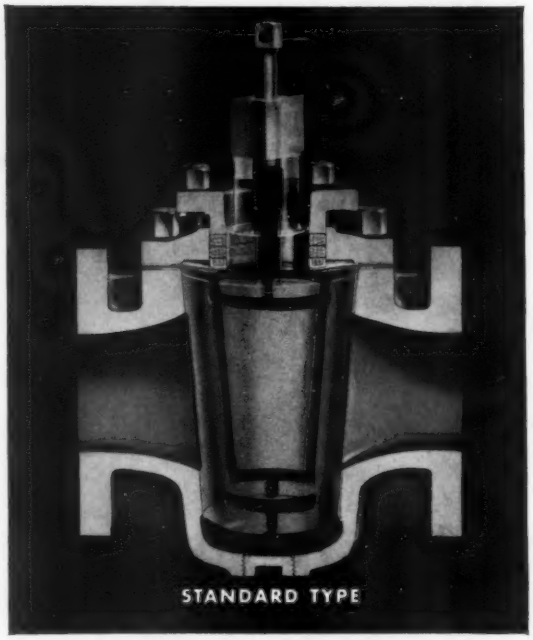

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Air Humidity

What It Is: How It Acts: How To Control It:

by
O. J. Kuenhold
Engineer, Humidifier Department
Monmouth Products Company of Cleveland

THE public is very noticeably becoming more interested each year in the question of healthful indoor air humidity during the heating season. Evidences of this are the increasing sales of humidity indicators and the demand for better humidifying equipment.

This increasing interest should by all means be encouraged by heating men because when Mr. and Mrs. Johnny Q. Public become interested in the healthfully humid condition of the air in their homes, they are taking the first step toward becoming air condition minded; and this sooner or later leads to their purchasing new conditioned air heating equipment.

Those who sell heating equipment should therefore be posted on humidification so that they can use their knowledge to make their sales work more productive and to foster interest in humidification among persons whom they contact. This article aims to explain air humidity in a clear, simple way, omitting non-essentials and technical terms, so that anyone can understand the main principles.

MOISTURE IN AIR

Air always contains *some* moisture in the form of invisible water vapor. The warmer the air, the more water vapor it can hold. Air at 70 degrees, for instance, can hold 20 times as much water vapor as air at zero degrees. Very little water vapor is required to make air at zero healthfully moist, but 20 times as much is required to make air at 70 degrees equally moist.

Outdoor air at zero usually holds about 93 per cent of the water vapor it *can* hold. As weather becomes warmer, it will hold a progressively smaller percentage of the water vapor it *can* hold, although the actual amount of water vapor held by each pound of air increases.

In weather below freezing, the amount of water vapor held by each pound of air at any given temperture varies very little in different locations—sea coasts, plains or deserts; North or South. The amount of water vapor held by the air, in weather below freezing, is therefore governed largely by existing outdoor temperature.

All the air within homes originates from outdoors by leakage at door and window cracks and elsewhere. Even when a home is closed, as in winter, outdoor air constantly seeps in on the windward side, slowly drifts across the rooms and escapes on the leeward side. The indoor air will therefore be the same as the outdoor air, containing exactly as many dissolved drops of moisture per pound of air, unless moisture is added. Whenever the amount of water vapor in the outdoor air changes, the water vapor in the indoor air will correspondingly change. As the outdoor temperature largely determines the water vapor content of the outdoor air, it also controls the amount of water vapor in the indoor air.

When the air was outdoors, during any of the weather temperatures given, the water vapor it held was a large percentage of the maximum water vapor that the air *could* hold at outdoor temperature, and enough to make the outdoor air quite moist. But when this same air enters the house and becomes warmed to 70 degrees it can hold much more "dissolved" water (33 drops per 16 cubic feet). Therefore the water vapor it holds is no longer enough to make it healthfully moist.

Each circle in the charts also represents about 3 per cent of humidity. Therefore, in zero weather the indoor air at 70 degrees will contain only about 6 per cent of the water it can hold at 70 degrees, if no moisture is added. In 40 degree weather the indoor air will contain about 24 per cent of the water vapor it can hold.

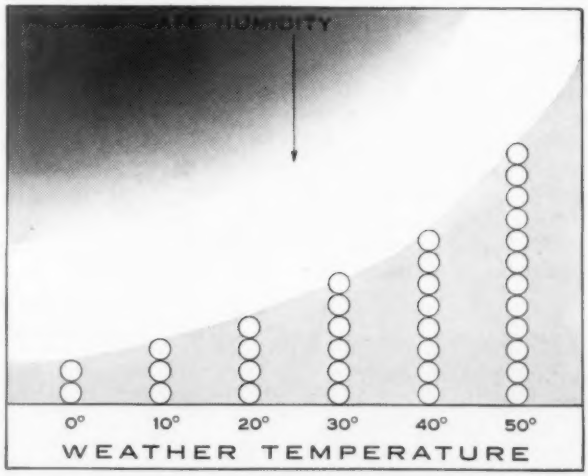

Chart 1

INDOOR AIR DRYNESS

Chart 1, graphically shows to what extent the amount of water vapor held by indoor air is changed by changing outdoor temperatures. Each circle represents one drop (4 grains) of water per 16 cubic feet of 70 degree air. For instance, the chart shows that in zero weather each 16 cubic feet of indoor air will hold only 2 drops of "dissolved" water. Note how this increases until in 50 degree weather each 16 cubic feet of indoor air will hold 12 drops of water.

Indoor air at 70 degrees should contain at least 8 drops and preferably 10 or 12 drops of water per 16 cubic feet, to prevent dry air damage to health and furnishings. Chart 1 therefore makes it plain that moisture must be added, especially when weather becomes severely cold. In zero weather, for instance, the indoor air should contain about four times as much moisture as it normally does.

How Much Humidity?

The question is often asked "How much humidity should be maintained?" The answer is that this depends entirely upon existing weather. The highest indoor humidity that it is practical to maintain is determined by the existing temperature of outside doors, walls and windows. When these get cold enough and the indoor air humidity becomes high enough, moisture from the air will be condensed, first on single glass windows, next on outside doors and within outside walls.

This condensation of moisture on windows, while being a nuisance, is ordinarily not serious. However, condensation on doors ruins varnish, swells and even warps the doors. Condensation within outside walls is hidden until serious damage become evident. It is therefore apparent that there is a limit to how high the humidity of the indoor air can be maintained, and this limit depends on the weather.

The lower edge of the shaded area at the top of the charts shows the safe and practical high limit for indoor humidity in all winter weather. This will be more fully explained further on.

How Should Humidity Be Controlled?

At first engineers assumed that the control of humidity was a very simple proposition, that all that was necessary was to have a humidistat and set this to maintain constant humidity at all times, just the same as a thermostat maintains constant temperature. It was further assumed that 45 per cent humidity, which is practical for 40 degree weather, would be correct for all weather.

Chart 2 graphically portrays the results and how wrong this idea is. In this chart, the white circles show the air humidity that prevails before any moisture is added. The black circles show how much moisture must be added in order to reach 45 per cent humidity. Each white or black circle represents 3 per cent of humidity or 1 drop of water per 16 cubic feet of air.

Note that in 30 degree weather the indoor humidity, represented by the column of white plus black circles reaches above the lower edge of the shaded area. As soon as this occurs, condensation takes place first on windows, then on outside doors and finally, during continued severe weather, in outside walls. Note that as weather becomes colder the number of black circles above the safe humidity curve increases. In zero weather over half of the added humidity is excessive and will be deposited somewhere as condensation.

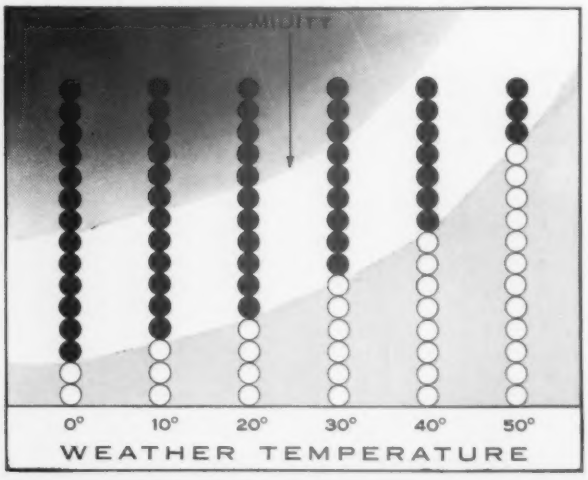

Chart 2

Obviously, this method of humidity control is wrong. To prevent the resulting danger, the humidistat must be manually or automatically reset to maintain lower humidity when outdoor temperature drops, or to constantly maintain not over about 20 per cent humidity, which is lower than is desirable continuously.

Another erroneous idea prevails that the amount of moisture evaporated into the indoor air should be proportional to the amount of heating done. With this end in view two types of evaporators are employed. One includes a water pan in which the water is maintained at constant level. The higher the furnace temperature, the more water is evaporated. Another type has a heat controlled valve that puts more water into the pan when the furnace becomes hotter.

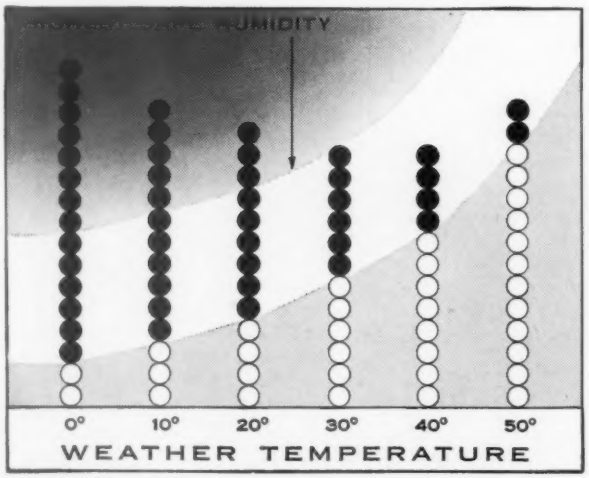

Chart 3

Chart 3 clearly explains the results which follow when the moisture added to the indoor air is proportional to the temperature of the furnace. The white circles show original humidity. The black circles show added humidity, assuming an evaporator of adequate size for average winter weather. Note how the amount of water evaporated (black circles) increases as the furnace becomes hotter. This means that, in weather below freezing, the room humidity will rise as weather, windows, outside doors and walls become colder and the maximum safe humidity becomes lower. This result is exactly the reverse of what it should be.

Chart 3 therefore makes it plain that to add moisture to the air in proportion to the furnace heat is wrong in principle and should not be depended upon during weather

colder than about 30 degrees. Above that weather temperature, control of evaporation solely by furnace heat is perfectly correct.

The third way to control room humidity is by constant water feed to an evaporator of proper capacity. Chart 4 plainly shows the results. The white circles show original air humidity. The black circles show amount of water supplied to the evaporator and evaporated. The dotted circles show water supplied to the evaporator but not evaporated. Note that, regardless of weather, the water added (black circles plus dotted circles) is always the same, namely 6 drops of water for each 16 cubic feet of indoor air. Also note the important fact that, when water is thus supplied, to the evaporator at nonchanging rate, the room humidity will be raised just high enough to reach the safe humidity curve in all weather below freezing, but no higher.

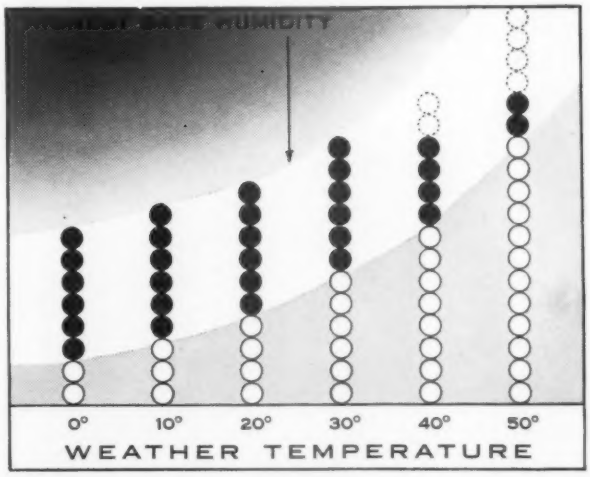

Chart 4

Also note that, once the feed rate has been set to produce correct results in weather of about 30 degrees, the results will be correct for all other weather, and the owner can safely leave home with heat and humidifier turned on, knowing the humidity will automatically reduce itself if weather should become colder.

This method of humidity control uses the naturally occurring humidity as a base, adding to it a constant increase of humidity (6 drops of water added per 16 cubic feet of indoor air). As the natural occurring indoor humidity is controlled by the outdoor temperature, the resulting higher humidity is also controlled by the outdoor temperature. The final result is that the maintained humidity is automatically graduated by the weather to suit the weather. When outside walls, doors and windows become colder, the humidity will become lower, thus reducing or eliminating condensation.

Evaporating Capacity Required

It is unfortunately, a fact that many humidifiers are sold having grossly inadequate capacity. This practice is harmful to the conditioned air heating industry. A wider understanding of how to calculate required evaporating capacity is needed, and should help those who wish to give their customers proper and adequate equipment.

The amount of water to be evaporated depends upon how much air leaks into a home. In order to increase the moisture content of the inleaking air, by 6 drops per 16 cubic feet, which we have shown to be the correct amount, we must evaporate one quart of water into the indoor air for each 10,000 cubic feet of air entering the home. Note that the volume of inleaking air determines the required evaporating rate. Obviously a leaky house requires more evaporation than a tightly built house with weather stripped doors and windows. If air is drawn from outdoors and then circulated, much greater evaporation is required.

The amount of water that can be evaporated per square inch of exposed water pan surface, depends mainly upon the temperature of the air passing the water pan and partly upon its turbulence or velocity. The total area of evaporating surface exposed in the furnace bonnet must be adequate to evaporate the required amount of water even under the low average furnace bonnet temperature existing during weather at about freezing point. This will give greater evaporation when colder weather requires higher average furnace bonnet temperature, but this excess evaporation can and must be controlled.

If the evaporating pan is too small to evaporate enough water in average winter weather, which is at about freezing point, then the home owner will not obtain adequate humidity during possibly 80 or 85 per cent of the heating season.

The simplest way to calculate required water evaporating surface or water pan area is to base this upon the rated B.T.U. output of the furnace. Divide the B.T.U. output of the furnace by 180; this will give you the required square inches of water surface, assuming a weather-stripped house and forced air circulation (about 150 degree designed maximum bonnet temperature). If the house is not weather stripped, twice as much water surface is required. If air circulation is by gravity, the bonnet temperatures will range higher, and about 50 to 75 per cent less water surface will be necessary than as above calculated.

Importance of Humidification To Heating Trades

Humidification is important to the heating trades, not merely because of the humidifiers that can be sold but mainly because sales work on humidifiers finds prospective purchasers for other heating equipment. Many a home owner whose primary interest is in a humidifier can be converted to purchasing complete winter air conditioning equipment.

Therefore sell humidification, but sell adequate humidifying capacity and include proper humidity control. Humidification is here to stay. The need for it was originally fostered by the medical profession and is endorsed by leading nose, ear and throat specialists. Its benefits to health are proven by scientific investigation and well established by experience. The damage of dry air to the interior of homes and furnishings is well known. Cracks in plaster and creaky furniture attest this. Dust count in dry air is increased. Art galleries know that the air in them must be humidified to prevent damage to valuable paintings. If you are in the house heating business then you are in the humidification business too.

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The Melting of Metals

Part 1. The Soft Metals

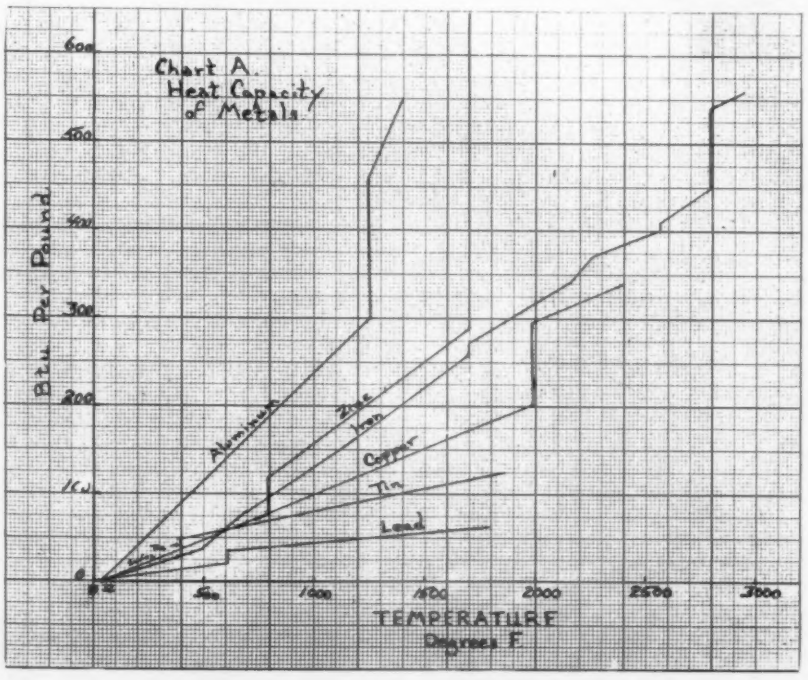
by
Raymond F. Mann
Wentz-Mann Company
Kenmore, N. Y.

A VERY frequent call upon the industrial gas engineer is for advice relating to the melting of some kind of metal. The variety of metals that may be involved is almost legion, running in temperature requirements from little above room temperature to the highest ranges available with gas combustion.

The little scrap iron and junk yard will be melting up scrap lead and casting it into pigs. Perhaps they will be making solder and some of the simpler alloys. Occasionally they may even be interested in the reduction of drosses. Every newspaper is melting stereotype metal, both on a large scale in pots running from 2 to 12 tons capacity, and on a small scale in the linotype machines. Most cities will have at least one brass foundry, where brass and bronze castings are produced. Many will also make aluminum castings. The manufacturing jeweler is interested in the melting of gold and precious metals. Pattern shops quite frequently cast patterns of brass or aluminum. Die casting is built around the melting of certain alloys. Galvanizing involves melted zinc and tinning involves melted tin. Automobile assembly plants, railroad shops, airplane plants, battery manufacturers, can manufacturers, and a host of other industries have problems in the melting of some kind of metal.

On the face of it there is little in common between the melting of a ladle of Babbitt metal and the pouring of a 500 pound heat of cast iron from a tilting type crucible furnace; but they do involve the same fundamental principles, and can quite properly be treated in the same article. We will take up a few basic considerations first, and then discuss each metal or group of metals in turn, starting with those of the lowest melting temperature.

In drawing up our estimates of the heat required for any specific melting operation, we find the calculations as a rule quite simple. The properties of the metals are well covered in the various handbooks on engineering subjects; and we can easily find the specific gravity, specific heat, and latent heat of fusion. As a matter of fact, this entire calculation has been reduced to a chart for the more common metals (as illustrated below); and being given the final temperature required, we can read directly the total heat in the metal per pound at that temperature. Then but three other factors need consideration: The heat absorbed by the container, the heat absorbed by the setting, and the heat loss from the surface of the metal during the operation. The container for low temperature work is usually iron; and knowing its weight or its dimensions, the same chart gives its heat demand. On high temperature work fireclay crucibles are usually used, but their heat demand is negligible in comparison to the metal. The heat absorbed by the setting can be calculated by methods already given (see AMERICAN GAS JOURNAL of May 1938), as well as the heat loss from the surface, which may be of considerable importance. With a little experience we fall into the habit of using certain round numbers, such as ten pounds of lead per cubic foot or three cubic feet of gas per pound of brass—figures that we have found to fit local conditions and standard practice. As good engineers, however, we should be careful to check our rule of thumb figures whenever the process involved departs from the normal in any way.



It may be well at this time to emphasize the fact that the temperature at which melting occurs is not the sole guide as to the quantity of heat required to bring about this change of state. Thus tin melts at 450° F as compared to 620° F for lead, but at any temperature above 620° F the heat content of the tin is approximately twice that of the lead. In other words it requires twice as much heat to melt the metal of the lower fusion temperature. In a similar fashion, aluminum, although it melts at a temperature far below that of copper, requires nearly twice the Btu input for its change to the liquid condition. Table 1 and Chart A bring out these facts.

Another factor that often demands

TABLE I

THERMAL PROPERTIES OF COMMON ELEMENTARY METALS

Metal	Specific Heat: At 60° F	Specific Heat: Mean from 60° F. to Melting Point	Latent Heat of Fusion B.t.u. per Lb.	Specific Heat of Liquid	Melting Point ° F	Total Heat above 60° F. in Melted Metal at Melting Point—B.t.u. per Lb.
Aluminum	.213	.249	169.2	.252	1218	457
Antimony	.049	.054	70.2	.054	1167	130
Bismuth	.029	.031	22.5	.035	520	37
Cadmium	.055	.058	23.0	.074	610	55
Chromium	.105	.163	126.0	.16	3270	650
Copper	.092	.105	88.7	.20	1981	291
Iron	.115	.159	88.6	.150	2795*	534
Lead	.031	.032	10.1	.032	621	28
Magnesium	.251	.281	126.0	.27	1204	448
Manganese	.121	.172	66.0	.198	2300	451
Mercury	.033	.033	5.0	.033	—38	—
Nickel	.105	.129	131.4	.134	2651	465
Silver	.056	.062	46.6	.065	1761	152
Tin	.052	.061	25.9	.060	449	50
Zinc	.092	.100	47.9	.119	787	121

* The melting point of cast iron is generally between 1950° F. and 2250° F., depending on composition. The pouring temperature of metals is generally from 100° F. to 200° F. above the melting point.

1938 The American Gas Catalog and Handbook

attention is the time requirement. In most heating processes the full capacity of the burners is made available at once. In many melting operations such a procedure would lead to an expensive reduction in pot life. When pigs of metal or scrap are charged into a cold pot there is little actual surface contact of charge and pot. Hence heat put into the pot is transferred but slowly to the charge. If the full burner capacity is turned on at once, it is easily possible to overheat the pot and shorten its useful life. Therefore it is necessary to bring the heat up slowly until some of the metal has melted. Heat transfer from pot to liquid is much higher, and the burners can then be turned up. It is desirable if the same product is being produced from day to day to leave a "heel" in the pot at the end of each run. This "heel" makes solid contact with the pot and enables a greater input to be applied at the start. The actual loss in efficiency in melting a bulky as compared to a compact charge is illustrated in the following table, giving the actual gas consumption to melt a charge of brass turnings and borings as compared to a charge of heavy scrap. These figures were taken from successive runs in the same furnace.

Another factor to consider in design of melting furnaces is the harmful effect of direct flame impingement upon the pot. Strains are set up that contribute to short life, especially if, as described above, it is at the start of a heat and the rate of heat transfer is poor. An oxidizing flame should also be avoided as being especially deleterious. Thus the usual design calls for tangential firing, with the flame directed between pot and wall and swirling around in practically a horizontal plane. For the lower temperature operations where atmospheric type burners can be used, the usual type is a ring burner located below the pot and at a sufficient distance to avoid flame impingement. The immersion method of firing is of increasing importance, and of course avoids either of these faults. Where direct firing is used with blast equipment, it is good practice to shift the pot slightly each day around its vertical axis to overcome any possibility of overheating a certain spot.

Since pots will fail, correct design allows for this possibility and provides a proper drain hole in the setting to allow molten metal to escape, thus protecting the burner as far as possible from any contact at such times. Naturally there should be frequent inspection of kettles, and those close to failure scrapped in adequate time.

The nature of the pot varies with the metal to be heated up and the temperatures involved. In low tem-

Charge	*A* Brass Borings	*B* Heavy brass scrap
Hours operated	6 hr. 35 min.	1 hr. 37 min.
Heats poured	4	2
Wt. metal charged	1352	638
Wt. metal cast	1316	607
Lbs. per heat	338	319
Time per heat	1 hr. 31 min.	41 min.
Gas per heat	1805 cu. ft.	839 cu. ft. (900 Btu gas)
Cu. Ft. Gas per Lb.	5.3	2.63
Ave. gas per hour	1190	1215

Note:—The unit fuel consumption under A is the average, and includes the first heat from a cold furnace. The minimum fuel consumption of any one heat for borings in a hot furnace was 4.4 cu. ft. per pound. If the heat had been applied more slowly, undoubtedly the efficiency with the borings would have been higher; but on a production schedule time is often of greater importance than fuel economy.

Soft Metal Furnace for Lead, Zinc, Tin, Solder, White Metal and Low Fusion Alloys. Equipped with Atmospheric Burner and Cast Iron Pot. *Eclipse Fuel Engineering Company.*

perature work for lead, tin and many alloys, cast iron or pressed steel pots prevail. Each has its advantages. Cast iron is cheaper, heavier, and has greater resistance toward aluminum and antimony. Pressed steel is lighter, heats up faster, has a greater strength at high temperatures, and is more uniform in quality. When zinc is involved, neither is satisfactory; and one of the alloy irons is necessary for real life. At higher temperatures the fireclay crucible comes into its own. It withstands the temperatures and does not alloy with its contents. It is rather fragile in comparison with iron but of surprisingly long life in general.

Crucible life is of major importance at the higher temperatures, and represents an item of cost often as great as the fuel. Thus it deserves every consideration. Design and burner equipment should be such as to contribute to long crucible life.

Metal loss is another important item. Certain metals, such as tin, are especially volatile; and melting practice has to take this into account in the making of alloys. Burner design often affects metal loss, and so must be borne in mind.

These factors will be considered further in discussing the individual metals. So leaving these preliminary remarks, we will take up first the so-called "soft metals", lead, tin, zinc, and alloys of these elements, all melting at temperatures well within the range of atmospheric burners.

Lead

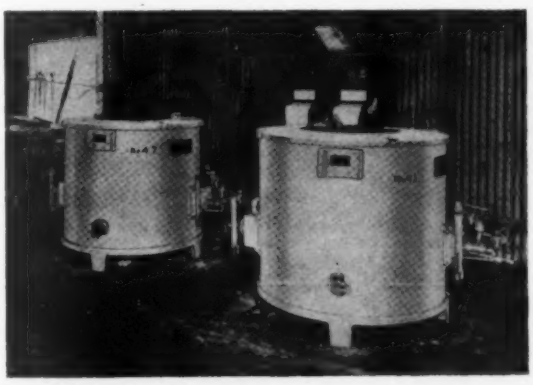
The melting of lead is perhaps the most common of all, and is carried on in furnaces running from a few pounds capacity up to several tons. In the former case, atmospheric burners are usually employed. In the latter case, in order to get greater speed, the blast type of burner is more common. Several manufacturers make standard furnaces for lead melting, and the gas input and time required can be read directly from their catalogues.

The simplest of all handles but a ladle of lead at a time, and consists of a small ring burner in an open frame on which the ladle is placed. With a relatively high Btu input melting takes but little over 5 minutes. The more conventional furnaces handle from 100 to 2500 pounds at a time, and have firebrick lined settings in which the burner is placed, the hot gases being directed against the cast iron or pressed steel pot. Although generally the liquid metal is ladled out, provision may be made for a bottom outlet. In such case care is taken to heat the outlet spout so as to eliminate possibility of the metal freezing again as it runs out. One manufacturer furnishes these furnaces either of atmospheric or fan blast type as may be desired. The fan blast type is somewhat faster and somewhat more economical in operation.

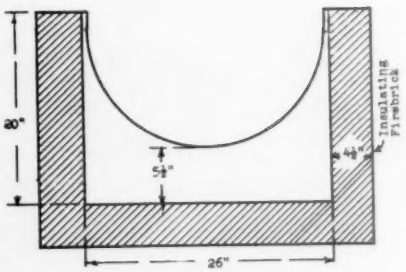
Catalogue ratings give an output of 4.5 to 6.5 pounds of lead per cubic foot of 580 Btu gas for these standard furnaces. This corresponds to a gross efficiency of between 31% and 45%—very good figures indeed. As explained above, the nature of the charge will affect the efficiency considerably, and a figure of approximately 45% would represent the best of practice, a good "heel" in the kettle and additional material added in heavy ingot form as rapidly as the liquid lead could take it.

Lead has, besides the lowest specific heat and the lowest latent heat of fusion, the highest specific gravity of the soft metals. Thus a pot but 24" in diameter by 14" deep will handle a ton of lead. This fact must be considered when some other metal is to be melted in a furnace rated in terms of its ability to melt lead. Although a certain pot will hold less tin or zinc than lead, yet tin or zinc demand more heat per pound than lead. Thus to a certain extent, the gas input per cubic foot of pot capacity tends to remain constant.

Of the metals, lead is the easiest to melt and takes the least gas per pound. The actual efficiency may vary very considerably with design, as was strikingly illustrated in a large battery manufacturing plant. This plant had been using gas for some years in kettles 24" in diameter by 14" deep, having capacity of approximately 2400 pounds. Each pot was located in a circular setting of firebrick and heated by a burner designed to use either oil or gas. High pressure air was used with natural gas, and a direct stack connection was employed. No thermostatic control was used. A five day test showed a production of 6,247 pounds of plates, which meant bringing 2400 pounds of lead to a melt each day as well, or a total lead melted of 18,247 pounds on a gas consumption of 6,100 cubic feet of 1,050 Btu natural gas. That corresponds to an output of 2.99 pounds per cubic foot.



Typical Soft Metal Furnaces Fired by Low Pressure Inspirator Sets. An installation of two SC Gas-Fired Standard Rated Soft Metal Furnaces. These furnaces are available, if desired, with hoods for carrying off fumes, or for protecting operators against splash. This installation is equipped with Automatic Temperature Controls. *Surface Combustion Corporation.*



Following this test the old firebrick lining was removed and replaced by insulating firebrick. A low pressure inspirator set feeding a 1¼" sticktite nozzle was substituted for the former burner, thermostatic control incorporated, and the direct stack connection eliminated. A five day test under these new conditions showed a total melt of 18,055 pounds of lead with a gas consumption of but 2840 cubic feet. This is equivalent to 6.36 pounds per cubic foot, or more than twice the efficiency before. Since the gas figure includes heating the liquid lead up to approximately 1,000° F and holding it at this temperature all day, it does not give directly the melting efficiency. As a matter of fact the actual melting required 2 hours and 5 minutes and consumed 200 cubic feet of gas. This equals 12 pounds per cubic foot and a thermal efficiency of 45%. The burner capacity is purposely low in order to meet the conditions of a long holding period.

In this particular case so many faulty elements were corrected that it is impossible to tell just how much each one contributed to the original poor showing. Tests on an atmospheric burner of the multitube ring type in the old setting without the direct stack connection or thermostat gave almost the same results as the improved figure, but required three hours for the melt. Of course in heating up, the thermostat effects no saving and is only of value during the holding period. The insulating firebrick setting must save some gas, but as its volume is small its value is not so apparent in this particular case. The direct stack connection was especially bad, contributing with the type of burner used to high excess air and an excessive stack loss. The entire case is an example both of the inefficiency that is permitted to exist for a long period of time and the savings that an industrial gas engineer can often make, thereby "making friends and influencing people" from considering other competing fuels.

Our calculations of the gas demand for this kettle illustrate the simplicity of estimating melting problems.

Data Given:—

Kettle 24" diameter x 14" deep.
Weight 116 lbs.
Capacity 2400 lbs. lead
Setting 26" internal diameter x 20" internal height.
Construction 4½" insulating firebrick.
Desired temperature 1000° F

$$\text{Internal area of setting} = \frac{\pi \times 26 \times 20}{144} = 11.3$$

$$\frac{\pi \times 26^2}{4 \times 144} = 3.0$$

Total 14.3 sq. ft.

Calculations:—

A. Heat Demand for Heating Up

Lead	2400 x 45 =	108,000
Kettle	116 x 140 =	16,240
Setting	$\frac{14.3}{12}$ x 53 x 220 =	13,860
Surface	1 x 7000 =	7,000
	Total =	145,100 Btu

$$\frac{145{,}100}{600 \text{ (avail. ht.)}} = 241 \text{ cu. ft.}$$

B. Heat Loss While Working

$\frac{1237}{8}$ = 155 lbs. lead/hr. x 45 = 6,975

Surface 1 sq. ft. x 7,000 = 7,000

13,975

$$\frac{13{,}975}{600} = 23 \text{ cu. ft.}$$

With 4½" firebrick, loss/sq. ft./hr.
@ 1200° F is 5 cu. ft. of 580 Btu gas

$$5 \times \frac{580}{1050} = 3.21 \text{ cu. ft.}$$

$$\text{For insul. firebrick } 3.21 \times \frac{2.5}{8.4} = .96$$

$$.96 \times 14.3 = \frac{13.8}{36.8} \text{ cu. ft./hr.}$$

Total

This gives a total for 5 days of 2,675 cubic feet as against the actual figure by test of 2,840 cubic feet.

We have heated lead pots as large as 42" in diameter by 17" deep, melting 5 tons, by means of atmospheric burners, using four 9-inch tile burners mounted in a firebrick setting. However, we find blast burners somewhat more efficient, and usually employ two or three firing tangentially. After all, lead is so easy to melt that most any equipment works; and the problem of the industrial engineer is to persuade the consumer to use efficient equipment costing perhaps a little bit more but paying for itself before long in fuel saving.

Tin

Tin has the lowest melting temperature of the metals, but a specific heat and latent heat of fusion twice that of lead, hence it requires more fuel to melt it. The same equipment as used for lead is satisfactory for tin, allowance being made for the lower specific gravity of the latter.

Tin is widely used as an alloying element, particularly in the low melting metals such as solder and the White metals. It is also used in the bronzes, where its volatile nature at high temperatures offers a considerable problem to the operator. By it-

(Continued on page 50)

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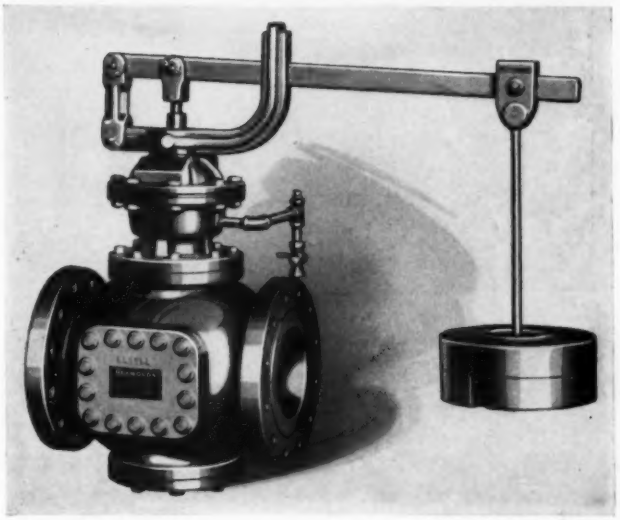

● Wide Delivery Range, plus Extreme Flexibility, are two of the features of the REYNOLDS High Pressure Line Regulator. Illustrated above, without the auxiliary bowl, this Reynolds unit assures accurate and dependable control of outlet pressures from 2 to 100 pounds in the line. This wide variance in outlet pressure is made possible by the use of four different sizes of diaphragm cases.

On inlet pressure the range is up to 650 pounds. The Reynolds High Pressure Line Regulator can be furnished in cast iron, steel or bronze body, depending on pressure requirements. This Regulator is also furnished with auxiliary controls if desired. Reynolds High Pressure Line Regulators are built with auxiliary bowl when so ordered. Efficiency tests made at the factory are filed for reference and are used later for checking all of these units in service. This system assures continued accuracy, safety, years of service and economical upkeep. Write for details.

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GAS CONTROL SINCE 1892

Gas In Industry Demonstrated At National Power Show

A. G. A. Industrial Gas Section, 2 Utilities, and 10 Manufacturers Jointly Exhibit Cross-Section of Industrial Gas Equipment

FEW national expositions attract a wider variety of executives, engineers and plant operating men from all over the country than the National Exposition of Power and Mechanical Engineering — the Power Show—held annually in connection with the yearly meetings of the American Society of Mechanical Engineers and the American Society of Refrigerating Engineers. The 40,000 industrial experts who customarily attend this show represent, it is estimated, at least 58 different and distinct industries — every one of them offering a fertile field for the use of gas in one or more branches of operation.

This year the thirteenth annual Power Show was held at Grand Central Palace, New York City, December 5th to 10th; and the Industrial Gas Section of the American Gas Association, jointly with The Brooklyn Union Gas Co. and Consolidated Edison Co. of N. Y., Inc., took over 616 square feet of floor space with 44 feet of frontage on a main aisle near the center of the first floor. In this area was assembled representative gas-fired equipment, produced by 10 leading manufacturers and covering a surprisingly broad range of industrial gas heating units.

The variety of the displayed apparatus indicated the tremendous scope of gas in industry—and it was just that phrase, "Gas In Industry," which was used to introduce visitors to the display. Located on a wing extending high into the aisle so as to be visible along the length of the hall, the theme was proclaimed boldly in illuminated letters.

The display was designed and executed by the Art Department of Consolidated Edison Co. and was manned at all times by men from that company, The Brooklyn Union Gas Co., and the exhibiting manufacturing firms. As the last of 6 displays at national industrial expositions sponsored this calendar year by the Industrial Gas Section of the Association, it was organized by that Section's Committee on Displays, chairmanned by D. W. Chapman. All planning was done by a working committee consisting of R. V. Howes and H. W. Butterfield, Consolidated Edison Co., Frank T. Herty and A. L. Palmer, The Brooklyn Union Gas Co., and Eugene D. Milener, American Gas Association.

Among those who exhibited gas burning industrial appliances were the following:

Eclipse Fuel Engineering Company—Gas-fired steam boilers.

American Gas Furnace Company and Charles A. Hones, Inc.—Gas-fired metal heat treating units.

Gehnrich & Gehnrich, Inc.—Gas-fired convection air heaters.

Campbell - Hausfeld Company — Gas-fired, tilting type, brass melting furnace.

General Gas Light Company—Unit heaters.

Surface Combustion Company—Industrial gas burners, gages, governors, etc.

Partlow Corporation — Temperature controls.

Ensign - Reynolds, Division of American Radiator Company—Ribbon burners, gas compressors, blowers and an improved type gas soldering furnace.

Johns-Manville — Industrial heat insulation.

Welded Construction on a Generator

By

Paul E. Lehmann
Welder
and
Wm. A. Spinti
Chief Draftsman
Milwaukee Gas Light Co.,
Milwaukee, Wisc.

The use of the welding process at our plant was at first very limited until its many advantages were brought to our attention through actual use of the process.

We found the need of replacing a water gas generator shell and it was decided the arc welding process would be used in place of the original riveted construction. The building of the shell was assigned to the maintenance department of our plant which furnishes gas to homes and industrial plants.

This generator is one of three shells in a water gas set. It is used, as its name implies, to generate the water gas. It contains a grate near the lower end of the upright cylindrical shell, which is about eleven feet in diameter and sixteen feet in height. The coke fuel is fed to the grate through an opening in the cover. A steam turbine driven blower furnishes the blast of air under the grates, and a steam connection furnishes the moisture or water for the gas.

There is a hot blast connection between the generator and the next shell in the set, which is the carburetor. The enclosed sketches and photos will show what the work consisted of. These shells are all lined with fire tile side lining, with an arch or crown.

We have no elaborate equipment with which to do our maintenance work, just ordinary equipment such as you would expect to find in any gas plant shop.

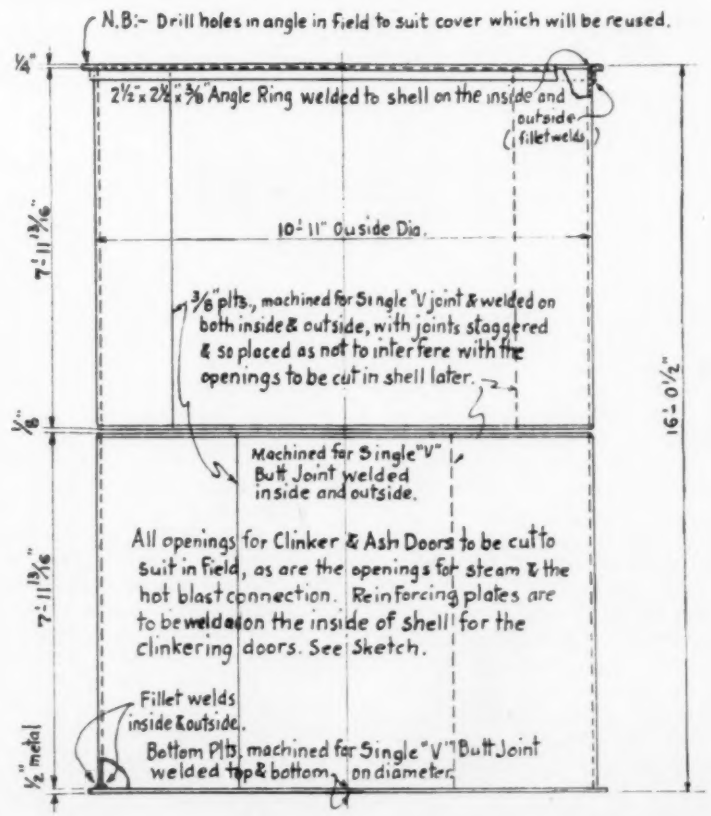
We designed the shell for the welded method which was a very simple job compared to a riveted shell. Because of lack of equipment in the maintenance department the shell was rolled to shape by an outside shop.

As the old cover was in excellent shape, it was reused as were the doors and their cast steel frames and a cast iron steam nozzle. For easy access into our water gas building and to its proper location in same, the shell was rolled in four parts, with an angle ring, and the bottom plate was furnished in halves. The old shell was removed and the foundation prepared for the new one. When the generator steel came, it was brought into the building without chopping out brickwork in the door or without using other special equipment as was necessary on previous occasions when the finished riveted shells were used.

The halves of the bottom were picked out and placed on the foundation, blocked up and placed in their proper relation to each other as to welding requirement, which in this case was ⅛ inch apart. After clamping, it was tacked every two feet centers, with a 2 inch tack. Two beads were put on until the groove was filled up. After cooling, it was turned over to again allow for a top horizontal weld which, of course, is quicker to make than the others. We placed the work in such a position so as to permit top horizontal welding whenever we could. The third bead of the weld was then put on the same as were the first two beads, except that in this case the tacking was not necessary on this side.

After the scale was knocked off and the work cooled, it was given two coats of red lead paint on the bottom side of plate only, as the upper side would later be welded to the cylindrical part of the shell. We used ¼ inch shielded arc "FLEETWELD" No. 7 for this plate. It might be mentioned here that this generator shell has to be gas-tight

Fabrication sketch for Generator Shell of Nº 5 Water Gas Set


N.B:- Drill holes in angle in Field to suit cover which will be reused.
¼"
2½"x2½"x⅜" Angle Ring welded to shell on the inside and outside fillet welds
10'-11" Outside Dia.
7'-11 13/16"
⅜" plts., machined for Single "V" joint & welded on both inside & outside, with joints staggered & so placed as not to interfere with the openings to be cut in shell later.
⅜"
Machined for Single "V" Butt Joint welded inside and outside.
All openings for Clinker & Ash Doors to be cut to suit in Field, as are the openings for steam & the hot blast connection. Reinforcing plates are to be welded on the inside of shell for the clinkering doors. See Sketch.
7'-11 13/16"
Fillet welds inside & outside.
½" metal
Bottom Plts. machined for Single "V" Butt Joint welded top & bottom, on diameter.
16'-0½"

ONE GENERATOR SHELL WANTED FABRICATED COMPLETE.

The authors of this paper received Honorable Mention, $101.75, in the Processing Division of the Industry Machinery Classification, of the $200,000 Award Program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, in which savings of $1,600,000,000 were shown available to industry by wider application of arc welding.

in its welds.

After the bottom plate was welded together, the halves of the lower section of the shell were arranged properly, checking the circumference, with the ⅛ inch spacer plates in place for proper welding conditions. It was then clamped at both ends with the cylinder lying on its side. These two joints in their final position in the set-up shell are really vertical, but in welding them, their position was horizontal allowing top horizontal welds. They were tacked every two feet with tacks two inches long, and then welded with two beads until the groove was filled, always skip welding as we saw fit to minimize distortion and warping.

The outside was welded first, one joint at a time, and then the inside was welded next, rolling the cylinder so as to have a top horizontal weld in each case. We used the same size and kind of rod as before—¼ inch shielded arc "FLEETWELD" No. 7. These joints were made with ⅜ inch plates while the former were with ½ inch plates.

The same method was used with the upper section except that an angle ring was clamped on the upper end of the shell. After the joints in the cylinder were welded, the heel of the angle was clamped a quarter of an inch higher than the square-edged shell plate. This angle was then tacked on, inside and out, as in the previous joints. Leaving the section upright, the inside weld was then made with a single pass, using a No. 7 "FLEETWELD" rod of ¼ inch diameter.

The cylinder was then inverted so that the angle ring was at the bottom. In its new position, it again allowed a top horizontal weld, which was then made with a single pass and the same kind of rod. This section was also checked for welding space between the single "V" edges, circumference, and height; as it had to fit on the lower section and be square at the top and bottom when assembled.

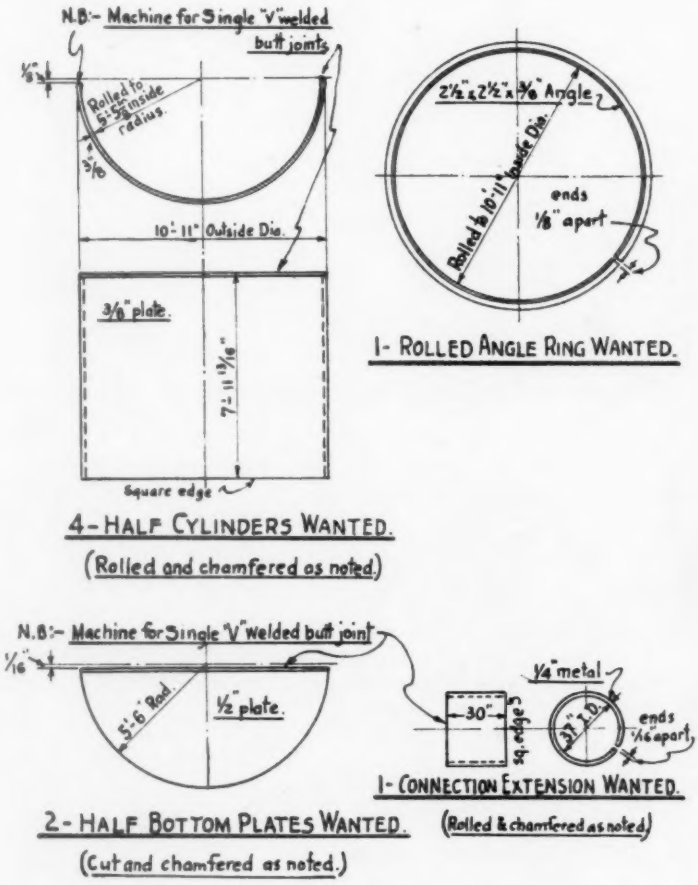
The welded bottom plate with under-surface painted, was now placed in its approximate final position, shimmed up with wedges to the proper elevation on its foundation. The lower section was next rolled over, and set on the bottom plate as close to its proper position as possible. This was done so as to be concentric on the bottom plate and at the proper distance, center to center from the carburetor, to which it must be connected by the hot blast connection. It was also turned to suit, not forgetting that the joints should not interfere with the clinker and ash door openings as well as with the steam connection and the connections which come from the blower. After these adjustments had been made, the lower section was formed and held in a circular shape by using trench shoring jacks at both top and bottom of section, with the planks used between them and the shell, extending a short distance above the shell. These jacks are long and they suited this purpose to a "tee." They answered the purpose of clamps and kept the shell halves concentric.

When this cylinder was trued up, it was immediately tacked onto the bottom in the same manner as the other tacks. A one pass fillet weld was then put in, on the inside first, and then one on the outside. The trench jacks were left in the lower section with the ends of the boards projecting above the top of the section. These boards or planks were properly tapered to act as guides for centering the upper section when it would be lowered onto the bottom section of the shell.

The upper section was hoisted and then lowered into position similarly as was done with the lower part, inserting ⅛ inch spacer plates for the welded joint just before the two parts came together. Another set of trench jacks were used in the upper section to bring it into a circular shape, after which it was tacked to the lower half in the same manner as the other tacks. Then the inside weld was made. As it was a horizontal girt weld, we used a No. 5 "FLEETWELD" shielded arc rod, and used lowered voltage and amperage. (We find this a very good rod for all around welding, working well under most all conditions.)

Next, the outside girt weld was made in the same manner as was the inside. It will be noticed that up to this point all the welds have been top horizontal welds, or equal, because the work had been so arranged as to make them such. Having progressed to this point, it became necessary to cut in all the openings for the different connections and for the clinkering and ash pit doors. This was done to suit the conditions in

Sketch for Ordering Rolled Steel Parts for New #5 Water Gas Set Generator Shell and Extension for Hot Blast Connection.



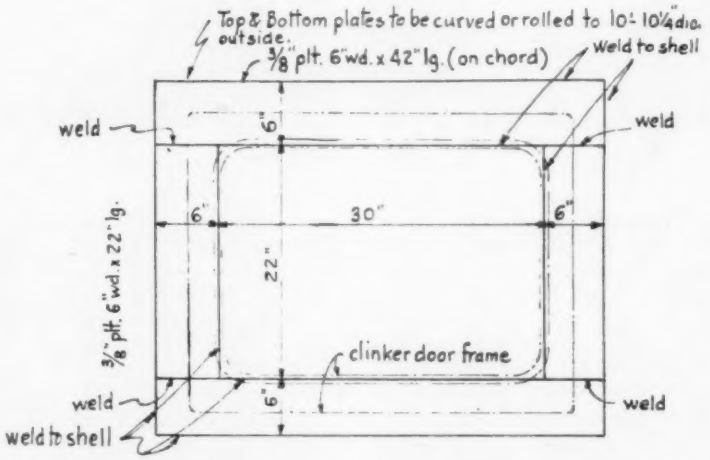
the field. After laying them out on the shell, they were cut out.

While this was being done, the steam connection nozzle, which was cast iron, was prepared for welding to the shell by putting on three "FERROWELD" rod skip-weld beads, each about 3 inches long, around the flange. This gave the proper bond for welding it to the shell with the ¼" No. 5 "FLEET-WELD" rod which we used. This same preparation was given to the five clinker door frames as well as to the three ash removal door frames, before welding onto the shell. As this was the first time we had occasion to weld cast iron or steel, to steel plates, we first experimented on a sample. After welding the sample, we gave it this test. We took a heavy machinist's hammer and pounded the steel until it broke off. After picking up the steel and examining it, we found it had torn part of the casting with it. We were then satisfied to use it, as we knew our castings would not get that much abuse. Of course, it may be said at this time, that all the castings we used could have been made of welded steel construction, but we had the castings on hand. When we need new ones, they will be of welded steel construction.

The prepared steam connection nozzle was welded onto the shell. The beads of the weld made a good bond with the casting and the shell. The flanged cast iron hot blast valve

was removed from the connection and the angle ring flanged joint was burned off. The extension which took the place of the removed valve was then welded onto the burned off end of the connection. The entire connection was then raised into position, lined up and affixed to the carburetor at one end, and the oth end welded to the generator shell. This extension did away with two flanged joints, and at the same time, with the possibility of leaks from them. This connection is lined with fire tile, and is quite heavy, more or less inviting leaks at these joints. The nozzle for the cold blast connection which had been cast iron was replaced by steel and welded in position next. The reinforcing plates for the clinkering doors were now clamped to the shell, both edges tacked, and then welded to the inside of the shell. This method had the advantage of sealing off sulphuric acid fumes from the shell. The riveted method allowed the coke and ash dust, combined with steam forming the sulphuric acid

REINFORCING PLATES FOR CLINKERING DOOR OPENINGS FOR GENERATOR SHELL OF Nº 5 WATER GAS SET.



REINFORCING PLATES FOR CLINKERING DOORS. 5-WANTED.

10 pcs. ⅜" x 6" x 22" lg. (flat)

10 pcs. ⅜" x 6" x 42" lg. (rolled)

fumes, to seep in. Not being protected by the fire tile lining and insulation as in other parts of the shell, this together with other possible fumes or hot gases corroded the reinforcing plates and shell at these places when the riveted method was used. Welding makes for more durability where no protection existed previously. The clinkering and ash removal door frames were the last parts to be welded on. The method was the same as used for previous castings. The welding finished and connections completed, it was given a coat of red lead on the outside. It presented a smoother appearance compared to the riveted shells with their lap joints, rivets and bolt heads projecting beyond the surface of the shells affording a place for the accumulation of coke dust, ash, steam and moisture to cause corrosion. Then again these same rivets and lap joints are the means of stopping the insulation, to some extent, from being properly distributed between the fire tile lining and shell by obstructing its passage. This also lessens the insulation thickness at these places somewhat. The rivets also caused the masons who lined the shell, trouble because the tile had to be cut to clear them at the clinkering door frame reinforcing plates. This often caused breakage of the tiles. At these places, around the clinkering door openings, there is no insulation and the tile being against the shell should seal it off. This is difficult if the surface is broken up by rivet heads. Therefore, the welded method is more efficient as to time required for lining at these places, there is no loss through breakage of tile. Also a more efficient seal is procured making for better protection and longer life of these parts. The welding of the door frames further protects the shell by completely sealing it from injurious agents which formerly attacked it and the bolts. This holds good also for the pipe connections, flanged joints and nozzles making the welded construction more desirable and durable and eliminating leaks.

In welding the angle ring to the top of the shell, the caulking of the sheet at the back of the angle is eliminated as the weld seals it making it gas tight. This saving is also effected on the girt joint in the middle of the shell and at the bottom where the shell is joined to the bottom plate. This is also true with the vertical joints in the shell and the joint in the bottom plate. When the time comes for repainting the shell, it will save time and be much easier to clean and prepare the smooth surface, than the surface with lap joints and rivet head projections, where cleaning is most needed and essential.

Here again we find the welding method far superior with greater durability coupled with economy in time, labor and materials.

Comparisons

In the welded method the inside and outside of shell remain smooth, flat and straight. There are no projections nor ledges for coke dust and ashes to settle to combine with steam or moisture and form sulphuric acid which readily attacks steel plates. This absence of projections also allows the insulation between the brick and steel shell to remain the same for the entire surface around the shell, keeping the heat away from the shell uniformly. This is important because the shell, through brackets at top, also acts as a support for a heavy operating floor which consists of steel and 4 inch paving brick. This construction is necessary because the floor should be readily removable and replaceable.

The riveted method causes an uneven insulating layer, and resistance to packing the insulation which later settles or packs, due in part to the projection of rivet heads. At the reinforcing plates around clinker doors, it requires the cutting of the fire tile for rivet and bolt heads, while welded reinforcing plates completely sealing the shell plates, do not require cutting of the tiles.

From time to time in the past, these sets needed to be rebuilt, either partially or entirely. In doing this, we used welding more and more as we became better acquainted with its merits and when this generator shell had to be rebuilt, it was decided to make it an all-welded job because our experience with arc welding was giving such complete satisfaction proving that we have confidence in its durability and practicability and its resulting economy in different ways over the older riveted method.

This is the first time we welded cast iron and cast steel to mild steel. We have found it to our advantage to do so in this case; we will naturally resort to it in the future wherever cast iron has to be used with steel.

Years ago, welding was a very

new process and more or less successful, but like every new thing, it had to overcome many obstacles such as prejudices and uncertainty, as well as technical troubles. Now, after all these years of experience with the process, experimenting with new alloys, and new methods, most of these objections have vanished. Even those who formerly were skeptical about the process, are now convinced of its possibilities, as its application in so many varied lines attests.

It is true, of course, time will prove more and more its adaptability to the varied uses to which it has been put, and undoubtedly will also bring many more new uses to light which are now either considered impractical or are undreamed of. The field, not yet scratched, seems to be endless.

When such industries as aviation, structural building and industrial manufacturing of many lines, adopt the process, there must be a good reason for it. For instance, aviation and the structural building industries could not possibly afford to take chances with the public's safety with an uncertain process. Neither can other manufacturing industries afford to overlook the economy and other advantages that welding methods offer if they intend to stay in business for any length of time.

We have found that proper protection such as leather clothing, jackets, aprons and gloves pay good dividends in feet of welds made in a specific time, as well as in time saved by preventing burns and in the safety of the welding operator. He feels safer and more at ease, doing better work as a result.

As has been shown, the arc welded process makes it a simple and easy matter to build durability, servicability and economy into our generator at the points where they are needed. When the above fact is fully realized and generally utilized, with the added reduction of weight possible with this process, the resulting savings accruing will be most welcome, especially in these times. The time saving feature alone is very important for utilities very often, where an uninterrupted service is maintained, by allowing resumption of operation just that much sooner. Utilities and others can readily see and appreciate these and other desirable qualities of this most versatile of all modern processes.

Cost of Material

Riveting Materials

4 plates for shell	8748	lbs.	
2 plates for shell bottom	2760	"	
2 L rings for shell	436	"	
1637 rivets, 360 bolts, gaskets, asbestos paper, 65 hrs. for compressor, 28 hrs. for power, punching & drilling	5000	"	weight of steel equivalent in cost to the items in bracket
Total	16944	lbs.	

Welding Materials

4 plates for shell	8748	lbs.	
2 plates for shell	2760	"	
1 L ring for shell	218	"	weight of steel equivalent in
200 lbs. welding rods, 23 hrs. for chipping by compressor, 10 gal. gasoline daily	1680	"	cost to the items in brackets
10 long reinforcing plates	276	"	
10 short reinforcing plates	140	"	
1 Hot Blast connection plate	251	"	
Total	14073	lbs.	

Comparisons of the time, direct labor cost, material cost and total combined cost in percent are as follows:

Comparisons

TIME

Riveted Construction

1637 rivets, driving	19	hrs.
335 feet chipping	23	"
335 feet caulking	23	"
2864 holes, punching	4	"
2864 holes, laying out	7	"
360 holes (bolts) laying out	1	"
360 holes, drilling	19	"
360 holes, Bolted castings	8	"
Total	104	"

Welded Constructions

1017 ft. of beads (not welds)	34	hrs.
3 connections complete welds	20	"
335 ft. of chipping	23	"
Total	77	hrs.

The entire welded construction time is 74% of the riveted construction time, or a saving of 26% in time is made by using the arc welded process in preference to the riveted method.

The entire cost of the welded material is 83% of the riveted material cost, or a saving of 17% in material cost is made when using the arc welded process instead of the riveted method.

Direct Labor Cost

Even though some disadvantageous conditions which would bring the cost of riveting higher than in the welding method were mentioned, they were not considered in computing the direct labor cost.

The entire welded direct labor cost is 70% of the riveted direct labor cost or a saving of 30% in cost of the direct labor is made by using the arc welding process in preference to the riveted method.

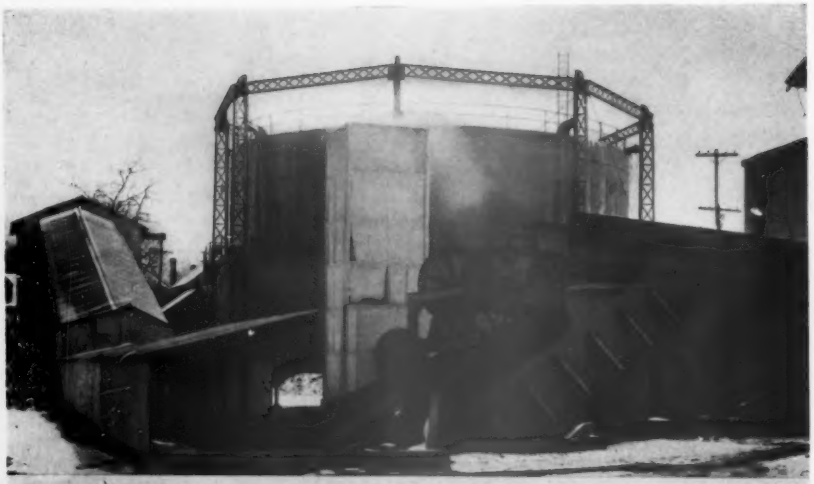
In arriving at the direct labor cost of the two methods, any cost or expense other than that for the direct purpose of fabrication of the shell, was not used.

Comparison of Costs

	Riveted	Welded	Saving In % In Favor of Arc Welding
Complete	100%	80%	20%
Material	100%	83%	17%
Labor	100%	74%	26%
Labor Time	100%	74.4%	25.6%

The above is for the fabricated generator only, not tile lined, or set in place ready to operate, etc. as that would not be a fair comparison of the methods or designs. Direct labor was considered in the above comparisons.

New Gas Plant a



Top—Coke quencher delivering to belt to coke screening station. Center—Control room. Bottom—Discharge end of ovens, with old retort foundation on left and gas engine power unit in foreground.

A Curran-Knowles coal gas plant was placed in operation early in November at Owen Sound, Ontario, Canada, by the Coal Carbonizing Company of St. Louis, Missouri. Construction commenced in June, 1938.

This plant consists of a small battery of three Curran-Knowles by-product coke ovens constructed inside of the retort house and replaces three old benches of horizontal retorts. It was expected that these ovens, operating on 12 hour coking time, would produce approximately 130,000 cubic feet of surplus gas daily. The ovens at present are producing approximately 140,000 cubic feet of surplus gas while being operated on a 13½ hour schedule.

The coal used is Kentucky high volatile screenings and a well prepared, low ash, low volatile coke is produced. This coke is quenched and sized into standard domestic sizes in a modern coke preparation plant and then loaded into trucks for local delivery. At present the coke is sold for domestic purposes, in three sizes: stove, nut and range. The coke produced is suitable for local metallurgical purposes and it is thought that some of the production will be disposed of for such use.

The surplus gas is purified in the usual manner and delivered to the consumer at the standard required by the municipality.

The plant is provided with 150,000 cubic foot holder capacity including a 100,000 cubic foot holder completed in November, 1938, built by the Stacey Manufacturing Company,

at Owen Sound

Cincinnati, Ohio. The added storage capacity will adequately provide for the increased demand expected from lowered rates.

In addition to the coke and gas, a large yield of tar is recovered.

The coke pusher is located outside the retort house; and when occasion demands the doors are raised and the coke pushed or the coal leveled.

The accompanying photographs illustrate the new installation.

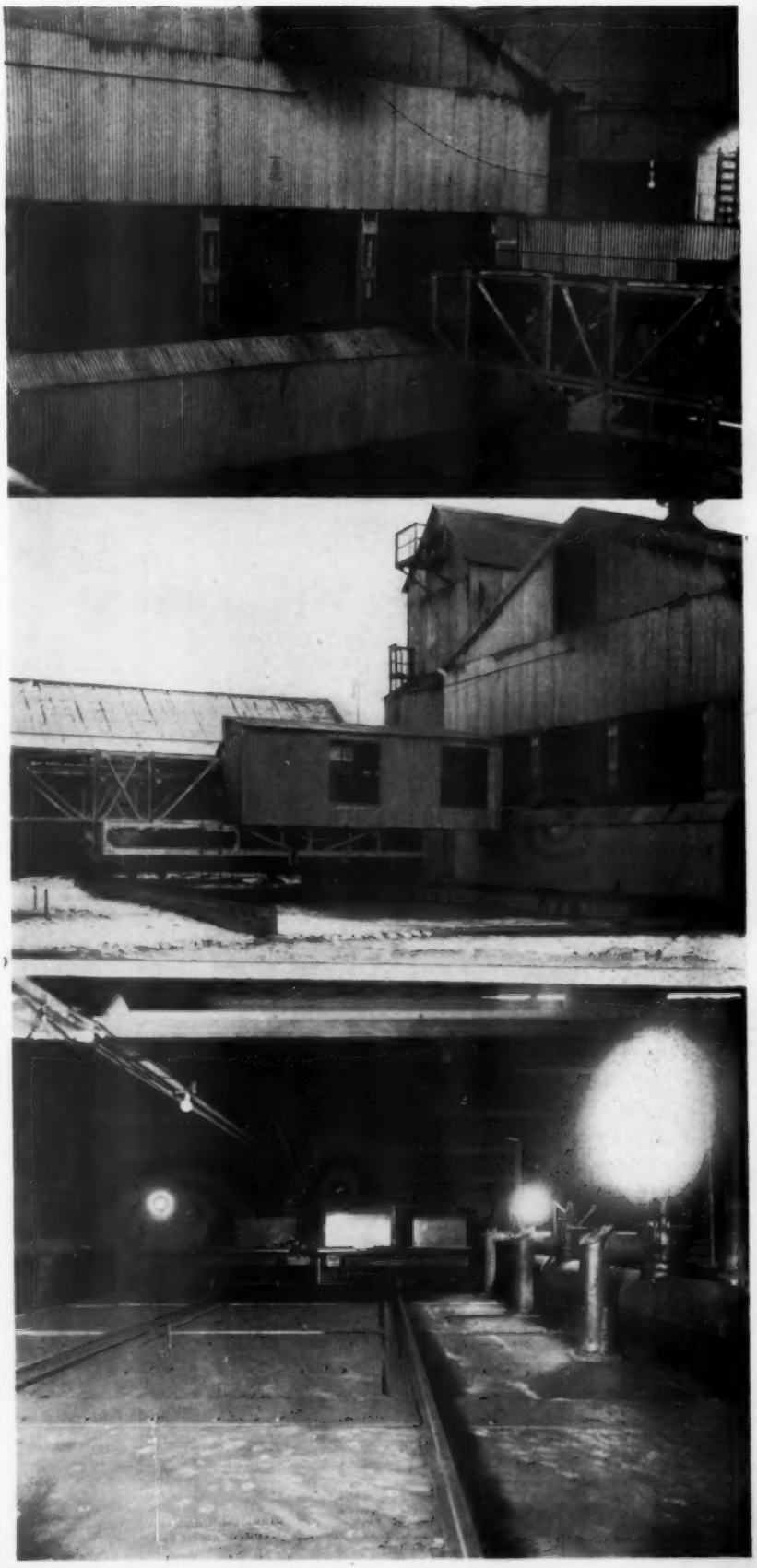
A novel feature of this plant is that it is in reality a small yet complete by-product coke oven plant located in existing buildings where it is protected from the weather. It is thus insured against delays in operation which may occur during the winter in a northern climate.

The coal is charged into the ovens from a charging car and the coke is pushed in the manner customary in larger plants. The gas is collected in well known type of collector mains and scrubbed and purified in modern apparatus.

Another novel feature of this operation is the use of coal gas as engine fuel for the motive power on pumps, exhausters, compressors, coal handling, coke handling, pusher and charging car.

The operation of the plant requires only two men per shift, with one mechanic on day shift to take care of repairs and prepare the coal.

The amount of gas produced can be regulated by the coking time of the ovens, and operation to date indicates a high thermal efficiency for the heating system incorporated in this type of oven.



Top and Center—Two views of pusher end of ovens and of coke pusher. Bottom—Coal charging car on top of ovens.

STRAW HATS IN JANUARY

A trifle LATE for
Home-Heating

A trifle EARLY for
Water-Heating

JUST RIGHT for

HUMIDIFICATION

with the

REPUBLIC HUMIDIFIER

A complete gas-fired appliance at a popular price.

AUTOGAS CORPORATION

Chicago Illinois

General Sales Agent

Republic Heaters Sales Co., Chicago

TITAN WATER HEATER CONTROLS

AGA Approved TITAN Temperature and Pressure Relief Valve

This device is installed on the hot water outlet in the tank directly in the flow of water. Action, as a result, is unfailing and positive, there being no dead pockets to prevent proper functioning of relief valve.

Pressure relief is obtained through a spring-loaded valve which opens when the pressure reaches a predetermined point. Should the water become overheated to 200° F, a fusible disc melts and lets the water escape thereby preventing a further increase in temperature.

The Titan Relief Valve serves as a coupling connected in the line thereby eliminating the necessity and expense of a tee fitting. To replace fusible disc, it is not necessary to disassemble valves or piping in any way.

Designed for application to storage or range boilers. Prevents corrosion, scalding and explosion.

Catalog and full information upon request.

The Titan Valve & Manufacturing Company

Thermostats • Safety Pilots • Relief Valves • Safetystats
9913 Elk Avenue Cleveland, Ohio

This Pump Governor Regulates Discharge

In the steam-line leading to any steam-driven pump, whether working on oil, other liquid, or gas, the Fulton Constant-Pressure Pump Governor will do just what its name declares. Discharge pressure will be constant. The diaphragm of the governor is connected to the discharge pipe and any variation of pressure there immediately affects the valve by which the speed of the pump is controlled. Both spring-weighted and lever-type governors are offered. Write for Bulletin No. 4096.

FULTON Constant-Pressure Pump Governor

The

CHAPLIN-FULTON MFG. Co.

28-40 Penn Ave. Pittsburgh, Pa.

CF

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS

FOR

ALL MAKES — ALL SIZES OF METERS

LARGEST GAS COMPANIES NOW USING OUR PARTS

SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES GLADLY SENT

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LAMBERT METER CO.

BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

A Restaurant Man Views the Fuel Problem

Veteran Chicago Restaurateur, Explains "Why Gas" In His 13 Stands

by

D. L. Marquis

Treasurer
Marquis Chain of Restaurants
Chicago, Illinois

OUR BUSINESS consists of thirteen lunch rooms located on Chicago's North and Northwest Sides, each with individual preparation and service kitchens, and all supplemented with a conveniently located commissary. Our growth has been gradual over the past twenty-five years that we have conducted this business. An old adage relates that "experience is the best teacher"; and our organization with 25 milestones behind it, believes it has reached the stage of definitely reaping the benefits of such experiences, particularly where the use of fuels is concerned.

At this point I will admit that in our experiences and methods of operation, we have "run the gauntlet," so to speak, in seeking the best fuel for the particular job or jobs to be accomplished. We have tried *all* fuels that perhaps could be reasonably used for the many applications evident in restaurant operation; such principal fuels for instance as coal, oil, electricity and gas. In seeking the ultimate and superior in fuels, we asked ourselves the question, "What benefits and advantages are we striving to attain from our use of a given fuel?" And again old man experience supplied our answer. We wanted a reliable fuel, a controllable fuel, a flexible fuel, a convenient fuel, a responsive fuel, a non-variable fuel, and an economical fuel that lent itself to the utmost in performance efficiency when utilized in modern, perfected appliances. From our applied experiences, gas fuel has been *the only fuel* to fully and satisfactorily meet these most necessary requisites of the best fuel obtainable for volume cooking and allied requirements.

When those of us who have been in the restaurant business for lengthy periods of time look back in reminiscence at the crude, antiquated fuels and appliances we utilized and employed in former years, we wonder how we ever got by. Of course, food preparation was then accomplished at great sacrifices in time, labor, uniformity, quality and cost efficiency. And so we have been carried forward by the great hand of research until we truly have gone modern in all departments of our business to please the ever changing wants and preferences of our diners.

This paper was delivered by Mr. Marquis under the sponsorship of the Industrial Gas Section of the American Gas Association at the 20th Annual Convention of the National Restaurant Association held in the Furniture Mart, Chicago, Illinois, October 3-7, 1938. It is significant because the author speaks as a gas consumer and restaurateur of 25 years experience. Where gas stands with Mr. Marquis, is where gas should stand throughout the hotel and restaurant business.

—Editor.

In this transition of years, our kitchens and service departments have experienced numerous changes reflecting improvements. In these inevitable changes to succeed and survive, the fuels selected and employed have played a highly important part in the degree of success attained. We, as "old line" operators can vouch for this statement as a basic fact. For instance, let's take just one angle and assume we were still poking and stoking a coal range in our kitchens, with the resultant food output lacking in uniformity and flavor, and it wouldn't take long to note a sizeable depression in our receipts. Therefore, our organization considers and has accepted *gas* as the most logical and practical fuel for volume cooking and kindred purposes.

If I recall correctly, I believe some of the gas utility companies employ a slogan—"If It's Done With Heat, You Can Do It Better With Gas." I am going to be frank and say I really think they're right, and after I relate more to you about the appliance and fuel set-ups in our particular places, I believe you will understand whereof I speak.

As I mentioned previously, we have a centrally located commissary which houses our bakery division, laundry and general offices. Our baked goods are turned out by two gas ovens; one 2-deck peel type and another of the revolving type. Rounding out an all gas bakery in addition to the gas bake ovens, are two gas bakers' furnaces, a large gas deep fat fryer and a gas proof box. Formerly, we fired our bake ovens with coke and then oil, but our experiences with these fuels were far from satisfactory. Due to lack of control, we found our goods overdone some days and underdone on others. In addition, valuable floor space was taken up for fuel storage. Our bakers wasted time frequently waiting to get desired oven heats, and even then seldom got them. Using crude fuels had little tendency to promote bake shop cleanliness and so we decided to correct all these shortcomings by following the practices employed by many hundreds of other Chicago operators — we installed *gas bake ovens.* Now we enjoy absolute control over our oven heats, our bakers no longer are "oven

watchers," but now are able to spend the added time they have gained in more strict attention to the mix and preparation of their goods. Our shop is actually more sanitary with the use of gas ovens. Gone are fuel odors and the dust and grime deposits we encountered using other fuels; and one of the finest things about this whole situation is the fact that our operating gas cost is about on a par with that of our former cumbersome and troublesome fuels.

We operate our own laundry; and here gas plays another important role, being used as fuel in a large flat work ironer, this heavy duty gas ironer is easy to operate, its heats are easy to control and it does our work quickly and well.

Rounding out the use of gas in our commissary, is a 25-horsepower combination steam and hot water boiler, which automatically handles our space heating and hot water demands. Constant room temperatures in both offices and shop coupled with available hot water supply at predetermined temperatures at all times has proven comfortable, convenient and indispensable to us in the conduct of our business; and this job we also do with gas because our past experiences have proven it best suited for these particular jobs—and the price is right.

Concerning the cooking appliances we use in our thirteen lunch rooms, we prefer gas appliances, for the reasons I have previously stated. These include ranges, water heaters, coffee urns, steam tables, etc.

When we view the vast array of heavy duty gas appliances, we must admit, not from any personal, selfish or material reasons, that the gas industry has made great strides in producing equipment that has benefited and improved the operation of many of our businesses. Their appliance improvements have been almost revolutionary; so now we have discarded and condemned the cumbersome and wasteful practice of range top frying, we frown on the uninsulated range oven, we welcome the oven heat control—and so we reach a point where we cannot help but agree that scientific cooking innovations and practices are daily gaining favor, regardless of what you or I may think or do.

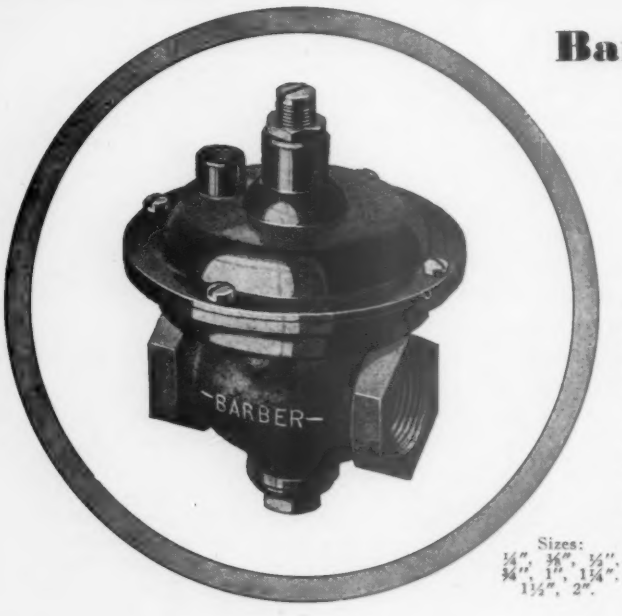
And in closing, I will readily state that gas as a fuel and as utilized in modern equipment, has played no small part in our attainment and retainment of successful and profitable restaurant operation.

IMPROVED EQUIPMENT — RUSSELL ENGINEERING

Coal Gas Plants—Horizontal Ovens, Benches, Refills, Additions, Repairs, Charging and Discharging Machines

DIVISION OF
COMBUSTION UTILITIES CORPORATION
24 STATE STREET
NEW YORK

Oil Gas Plants—"Refractory Screen" Process for Base—Standby or Peak Loads—On Existing or New Water Gas Sets Low or High B.T.U. Gas



Sizes: ¼", ⅜", ½", ¾", 1", 1¼", 1½", 2".

Barber Regulators Add to the Performance and Appearance of Any Gas Appliance

The trim, modern styling of Barber Regulators is a factor which counts, in today's heating equipment, and has influenced many gas appliance makers to adopt them as standard accessories. The prime importance of a thoroughly *dependable* regulator is now recognized as essential to flame control, safety, and fuel economy.

Mechanically, Barber Regulators are built to very high standards of accuracy, and tested for operation within 3/10 pressure drop. All-bronze body is compact and well proportioned. All working parts are brass. Sizes ¼" to 1½" tested and certified by A. G. A. Testing Laboratory. For appliances which you sell, sponsor, or manufacture, your use of Barber Regulators stands as an additional proof of Quality merchandise.

Attractive folders on this Regulator will be furnished free, at your request, for distribution to your trade. Write for catalog and price list on Barber Burner Units for Gas Appliances, Conversion Burners for Furnaces and Boilers, and Regulators.

THE BARBER GAS BURNER CO. . . . . 3704 Superior Avenue, Cleveland, Ohio

BARBER GAS PRESSURE REGULATORS

A New Year's Message
from Gas Appliance Merchandisers

by

Fred E. Kunkel

THE advent of the New Year offers splendid opportunity for the merchandiser of gas appliances to broadcast his standards of service, to sound the keynote of his business policy and to outline plans for the future expansion of his business. Such at least was the thought that prompted at least one gas merchandiser last year to profit by the spirit of the occasion when he released the following printed announcement to every customer and prospect:

We Dedicate the New Year To Service

"Business is sensitive. It goes where it is invited, and stays where it is well treated.

"Last year we tried to prove to you that we could provide the type of gas appliances and service which was appreciated by our regular customers and many newcomers who came to us for the first time.

"But if our service was good last year, this year it is going to be still better. This business is never satisfied with good enough, when it can give still something better.

"Service may mean the way our salesmen and employees greet you. It may mean the promptness with which they serve you and oblige, the attention they give your every want; the courtesy with which they comply with your wishes. It may be finding something here which cannot be obtained elsewhere. It may involve the many little business courtesies due you as a valued patron, a respectful, "Yes, sir!" or "Yes, Ma'am!" and "I Thank You," for which this business is noted, and in which we take a just pride.

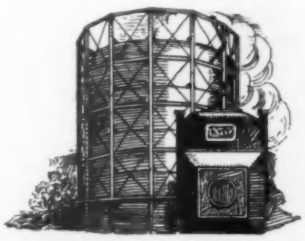
"Service may mean the spirit with which we answer the telephone or the promptness with which we respond to a customer's request, or the smile with which we greet them and the satisfactory way we have of answering every question. It may mean sterling reliability, quality gas appliances.

"Service, in fact, may mean many things, but to us service must mean everything!

"We shall try to make this business the sort of a place that you have always wanted it to be, the kind that is most talked about, pointed out on the streets, looked up to, recommended by one and all because of our strict adherence to carefully planned policies.

"We want to thank you most heartily for your patronage, and wish you great happiness and prosperity for the coming year!"

A shorter good will message used by another gas merchandiser was printed on a specially illustrated letterhead with a New Year Baby, and the copy was printed on the pages of an open book.



TO YOU!

"Who have helped to make possible a good business year in spite of conditions, we extend our most grateful thanks and appreciation. We hope to have your continued and increased support to the degree that we shall merit it.

"Our constant endeavor during the coming year will be, as in the past, to always please you!

"And we want you at all times to tell us of anything that does not strike you as just right! That's the way to grow, and we want to grow.

"So we're going to dedicate the New Year to the spirit of service more than ever before, and we're going to try mighty hard to live up to our contract.

"We wish you much success, happiness and prosperity for this year!"

SUPERIOR GAS METERS

For Sound Values and Continuous Operating Economy. Meters for Domestic and Industrial Use, All Sizes 5B to 60C.

Wet Test and Demonstration Meters
Diaphragms—Service Cleaners
Provers—Meter Repairs.

Superior Meters are built to A. G. A. specifications to provide complete protection against leaks and costly repairs. Write for details and quotations.

SUPERIOR METER COMPANY

167 41st Street ***Brooklyn, N. Y.***

Book Reviews

Report of Special Committee on DEPRECIATION presented and discussed at the Convention of the National Association of Railroad and Utilities Commissioners, November 15 to 18, 1938, New Orleans, La. Published by The State Law Reporting Company, 30 Vesey Street, New York, N. Y. Price $1.50 per copy.

The report entitled *"Depreciation Principles and Methods,"* prepared by the Special Committee on Depreciation of the National Association of Railroad and Utilities Commissioners, stresses the need for consistent treatment of depreciation, both for annual expense and accrued depreciation purposes. The volume contains a summary of 10 principal points which may be considered as a depreciation program recommended for regulatory commissions. This 10-point program, briefly, is as follows:

1. The same factors that cause annual depreciation also cause depreciation to be deducted from property in determining a rate base.
2. Commissions should use consistent methods in determining depreciation expense and depreciation for rate base purposes and stress the necessity for such consistency in their decisions.
3. Utilities should record the depreciation accruing in their property and commissions should insist that such procedure be followed under a sound method of accounting for depreciation.
4. The straight-line method is recommended for use generally for accounting and regulatory purposes.
5. The practice sometimes advocated of including straight-line depreciation expense as a cost of operation and deducting only so-called observed depreciation in determining a rate base is incorrect in principle and unjust in result and should not be permitted.
6. The reserve requirement should be deducted from utility plant in determining a rate base.
7. The reserve for depreciation should be shown on the asset side of the balance sheet as a deduction from depreciable plant.
8. Separate rates of depreciation and separate depreciation reserves should be used for each class of depreciable property.
9. In cases where the sinking-fund method of depreciation accounting is used, the so-called interest on the reserve balance should be included with the annuity provision in depreciation expense.
10. If the sinking-fund method is used in connection with an undepreciated rate base, the sinking-fund interest rate should be the same as the allowed rate of return.

In addition to the discussion of depreciation principles, the report contains a comprehensive analysis of the results of accounting for depreciation under both the straight-line and the sinking-fund methods. In these analyses it is indicated that over the entire life of property the straight-line method, when used both for annual depreciation and total depreciation purposes, requires a smaller amount for depreciation and return than does the sinking-fund method.

The report also contains an explanation of methods of estimating depreciation rates, including the forecast method, the turnover method, and the actuarial method. A comprehensive explanation of the turnover method is given, together with service life and age adjustment curves for use with various types of life tables. The technician will be interested also in the explanation of a method for smoothing and extending incomplete mortality data without the use of such rigid forms as the Gompertz-Makeham or the Pearsonian equations, which have been frequently employed.

Although containing considerable discussion of the various methods of estimating depreciation, the report particularly stresses the need for consistent application of depreciation methods.

The Perception of Light by W. D. Wright. Chemical Publishing Co. of N. Y. Inc., New York, N. Y., 1939, 100 pages; illustrated. Price $2.50.

The author explains how light is perceived, the difference in the perception of high and low intensities, adaptation of the eye to different intensities, glare, etc. He then relates theory to the practical problems of lighting. This book has value for those employees of public utilities who are confronted with lighting problems.

Contents: General visual phenomena; vision at low intensities; vision at high intensities; glare; visual sensations; recent researches; bibliography.

Soil Corrosion and Pipe Line Protection, by Scott Ewing. Obtainable through American Gas Association, New York, N. Y. 287 pages. Price $2.50 per copy up to 25 copies. Lower prices for 25 or more copies.

Dr. Ewing's long association with corrosion research at the Bureau of Standards and as Research Associate of the American Gas Association makes him particularly qualified to write on this subject.

For a number of years Dr. Ewing's reports have been a feature of the A. G. A. Conventions. In his book he has taken much from these reports and added a wealth of other valuable information.

Dr. Ewing is at his best in discussing theory and the results of research, and his book is particularly authoritative on such subjects as soil types and their corrosive properties, the progress of pitting action and field and laboratory tests. On the practical mitigation of corrosion the book is less complete.

This is essentially a text book on the corrosion of pipe and the protective qualities of coatings; and as such it is an authoritative work of particular value to those who wish to study or review these subjects, especially if they have in mind additional research work.

There are ten chapters as follows:

Pipe Line Systems in the United States.
Soil Classification as Related to Pipe Line Corrosion.
The Corrosion of Pipe Lines.
Corrosion in Distribution Systems.
Corrosion Survey Methods.
Bituminous and Related Coating Materials.
Methods of Applying Coatings.
The Inspection of Pipe, Pipe Lines and Coatings.
Relative Performance of Pipe Coatings.
Cathodic Protection and Electrolysis.

Gas Works Effluents and Ammonia by Arthur Key, Research Chemist of The Institute of Gas Engineers. Published by The Institution of Gas Engineers, 1 Grosvenor Place, London S.W. 1. 150 pages. Price 5s. net. Cloth.

This book covers thoroughly the disposal of ammoniacal liquor from gas works. It comprises a summary of the results of the investigations of the Liquor Effluents and Ammonia Committee, and its predecessors, of The Institution of Gas Engineers during the past twelve years, together with a comprehensive survey of the

present state of knowledge regarding the problems connected with the recovery and utilization of gas works ammonia and the disposal of effluents therefrom. It deals in rather surprising detail with the disposal of sanitary sewage, and covers the problems which arise when gas works waste is discharged into the city sewers. Methods of recovering ammonia in various marketable forms are reviewed separately.

As a work on ammonia recovery and ammonia waste disposal this book can be highly recommended. However, it is confined to the subjects above mentioned and does not cover the problems of waste disposal from carburetted water gas plants, which we must deal with so frequently in this country.

Contents: Gas works ammoniacal liquor; its nature and composition—Recovery of ammonia from ammoniacal liquor—Composition and treatment of town sewage—Discharge of gas works liquors to sewers—Effect of gas works liquors on sewage treatment—Other methods of disposal of gas works waste liquors—Methods for improvement in liquor production on Gas Works—Fertilizing properties of gas works ammonia products—Recovery of ammonia as ammonium sulphate with the use of sulphuric acid—Utilization of ammonia for the purification of coal gas—Manufacture of ammonium bicarbonate—Manufacture of concentrated gas liquor—Methods of analysis of ammoniacal and spent liquors—Methods of examination of sewage—Literature references.

This cartoon by Fred R. Meinke of Illinois Northern Utilities Co., appeared in Illinois Northern Utilities News, their employee publication.

Gas Display at Southeastern Regional Restaurant Show

Gas-fired restaurant equipment manufactured by American Stove Co., Detroit Michigan Stove Co., Standard Gas Equipment Corp., J. C. Pitman & Sons, G. S. Blodgett Co., and General Gas Light Co. was arrayed in two long wings extending right and left of one of the main meeting room entrances. The legend, "Gas . . . The Ideal Fuel," spread-eagled both lines of appliances.

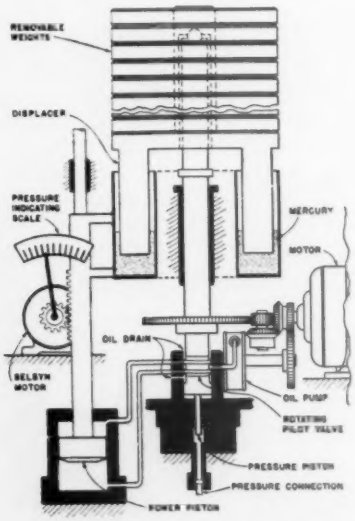
Credit for a fine sales job in behalf of gas and gas appliances in the restaurant goes to Henry M. Brundage, Jr., F. B. Hatcher, and Thomas M. Offutt, all of the Washington Gas Light Company, who organized the gas display, as well as to the representatives of that utility and the six exhibiting gas equipment manufacturers who manned the exhibit in shifts to answer the queries and stir up the interests of the visiting restaurateurs.

New Equipment and Appliances

Power Type Pressure Gage

A Power Type Pressure Gage suitable for the measurement of extremely high pressures and accurate to one tenth of 1% of the reading, has been developed by Bailey Meter Company, Cleveland, Ohio.

This gage as shown diagram-



Diagrammatic Drawing of Bailey Power Type Pressure Gage.

matically provides accurate pressure readings on an indicating scale and may also transmit these readings to indicators and recorders located at distant points.

The pressure to be measured is applied to a small pressure piston which supports a pilot valve and a table loaded with removable weights. A small motor serves to rotate the pressure piston and pilot valve, a ball bearing being provided so that the removable weights and weight platform need not rotate. The motor also drives a small oil pump which provides hydraulic pressure for operation of the power piston which in turn moves the mercury cup, the indicating pointer and the Selsyn motor for electrical transmission of readings.

When the applied pressure increases or decreases the pressure piston, pilot valve and weight table rise or fall and in so doing permit oil under pressure to pass through the pilot valve to the upper or lower side of the power piston.

For each pressure applied to the small rotating pressure piston, a definite position of the power piston, mercury cup and indicating pointer is obtained.

Gages operating on this principle have been built for suppressed ranges and extremely high pressures. The calibrated range remains constant at 2000 lbs. but the amount of suppression may be decreased in 1000 lb. steps by the removal of weights, one at a time. Well adapted to high pressure gas lines. More complete description available on request.

Howle Gas Fired Heater

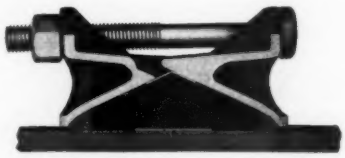
Combining a large heating surface with a long delayed flue travel in order to get maximum heat from the fuel is one of the features of this new gas fired heater. A patented burner with full Bunsen type blue flame 8 inches high in straight line design, requires a very small amount of excess air for perfect combustion.

It is provided with a patented up and down draft regulator of original design giving automatic control.

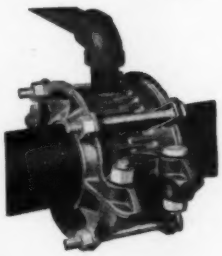
Much direct radiant heat comes out forward through the front grill and the heat passing through the top is deflected right and left by means of baffles making for better distribution. There are three sizes of 30, 45 and 58 thousand B.T.U. input. Has the approval of A.G.A. Laboratories. Made by The Howle Company, 335 South Western Avenue, Chicago.

Split Coupling Clamp

The Skinner Split Coupling Clamp consists of two sturdy malleable iron rings, halved, triangular shaped gasket, monel metal seal band, and cadmium plated steel bolts.



When gasket, seal band, and intermeshing main rings are in place and bolts are tightened, the triangular gasket space inside is reduced, creating pressure which seals the break instantly and permanently.



Adapted to the repair of breaks at services — at slight additional cost.

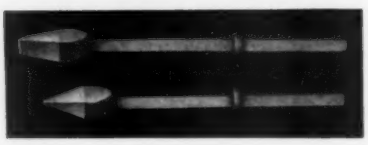
Tested to 800 lbs. line pressure. One man can apply it with ease. It goes on instantly and does away with wrapping and postponing of real repair. Compact, it can be used close to a bell.

Also can be used on corrosion or electrolysis holes. Made for pipe sizes 2 to 16 inches. Manufactured by M. B. Skinner Co., South Bend, Indiana.

Concrete Buster Steel

The Sullivan Machinery Company, Michigan City, Ind., has recently developed and marketed a new type of steel known as "Arropoint", designed for use with pneumatic concrete busters.

The outstanding feature of the



new steel is an upset end which provides a wider, more efficient point angle and locates more stock at the working end of the steel to provide greater resistance to drilling and breakage.

News of the Industry

Bissell Chairman of Personnel Practices Committee

William N. Bissell has been appointed chairman of the Committee on Personnel Practices of the American Gas Association by Conrad N. Lauer, president of the Association. For the past eight years, Mr. Bissell has been personnel manager of the eastern division of Niagara Hudson Power Corporation with headquarters at Albany, N. Y.

W. N. BISSELL

The Committee on Personnel Practices, now beginning its third year of existence as an Association activity, plans to make important studies of industrial relations problems of the gas industry. Previous work included the compilation of vital data on existing practices and the sponsorship of outstanding speakers at Association meetings.

George F. Mitchell on A.G.A. Advertising Committee

George F. Mitchell of Chicago, President of The Peoples Gas Light & Coke Company, has been appointed a member of the American Gas Association's Committee to Conduct National Advertising. The appointment was announced by T. J. Strickler of Kansas City, Chairman of the Committee. Mr. Mitchell will represent participating gas companies in Illinois, Indiana, Iowa, Michigan, Wisconsin and Minnesota.

More than 700 gas companies are supporting the advertising campaign which is now in its third year and has been approved by the Association's Executive Board for an extended term of three years.

CONVENTION CALENDAR

January

13 *New England Gas Association, Sales Division.* Dinner Meeting, 6 p.m. Boston.

20 *New England Gas Assn.*, Operating Division, Dinner Meeting, 6 p.m. Boston.

February

9-11 Midwest Regional Gas Sales Conference, Stevens Hotel, Chicago.

16-17 *New England Gas Association.* Annual Business Conference, Hotel Statler, Boston.

March

8-10 *International Acetylene Assn.* Rice Hotel, Houston. Texas.

19-24 *Southern Gas Association.* On board S.S. Rotterdam sailing New Orleans to Havana, Cuba and return.

April

12-14 Missouri Association of *Public Utilities.* Annual Convention.

May

2-4 *Pennsylvania Gas Association,* Annual Meeting, Sky Top Club, Sky Top, Pa. Secretary, Frank W. Lesley, Penna. Gas & Electric Co., York, Pa.

12 *Empire State Gas and Electric* Assn. Group Meeting (Electric Operating) Tower Club, Park Central Hotel, New York.

June

6-7 Canadian Gas Association, Annual Convention, Royal Connaught Hotel, Hamilton, Ont. Secy-Treas. G. W. Allen, 7 Astley Ave., Toronto 5, Ont.

9 Empire State Gas & Electric Assn. Group Meeting (Gas Operating) Tower Club, Park Central Hotel, New York.

Louisiana Engineering Society Annual Meeting

The Louisiana Engineering Society is planning to hold its annual meeting jointly with the spring meeting of the American Society of Mechanical Engineers on February 23, 24, and 25, 1939, at the St. Charles Hotel in New Orleans, Louisiana.

DeMey Heads Rate Committee

Appointment of C. F. deMey, rate engineer of the Columbia Engineering Corporation, Columbus, Ohio, as chairman of the Rate Committee of the American Gas Association has been announced by Conrad N. Lauer, president of the Association. Wide experience in the development of rate structures and the presentation of rate cases qualify Mr. deMey for the leadership of this important committee of the Association.

Now beginning its nineteenth year, the Rate Committee was formed in 1920 when the Executive Board authorized George B. Cortelyou, then president of the Association, to appoint a committee on "Methods of Charging for Gas." Its duties as established by the Board, are: "To make and present studies and recommendations to the gas industry on all

C. F. deMEY

phases of rate-making and rates, including the fundamental basis for determining proper rate levels; the structures, forms and types of rates which should prove most equitable to the utilities and their customers, and at the same time promote most effectively the use of gas, and any other matters having a direct bearing on gas utility rates."

A long line of authoritative reports have been made by this committee and are now a part of the Association's printed Proceedings.

Pittsburgh Water Heater Corp. Appoints Sales Representatives

Robert C. Hill, general sales manager of The Pittsburgh Water Heater Corporation, Pittsburgh, Pennsylvania, announces the appointment of Walter J. Kenney as the company's representative in the States of Ohio, Indiana and Illinois; E. M. Griswold, Jr., in Western Pennsylvania and West Virginia; J. D. Taylor, in the States of North and South Carolina, Tennessee, Georgia, Florida, and Chris Marsden in New Jersey and New York State. This enlargement of the Pittsburgh organization is in line with the company's expansion program, and these representatives will contact the trade, introducing Pittsburgh's 1939 line, and a "streamlined" Promotional and Selling Plan for merchandising automatic gas water heaters.

NEW
SMYLY
H_2S Tester

WITH PRE-TREATED TEST DISKS
"Handiest device of its kind," say gas men who have used it. No messy lead acetate solution. Quick, accurate tests made in a jiffy using dry pretreated paper disks. Pays for itself in time saved alone. Write today for Free Bulletin.
CUT PURIFICATION COSTS
Reductions in purification costs up to 50% have resulted from recommendations of Connelly Engineering Department. Connelly's complete purification service is saving gas companies thousands of dollars annually. Write for details.
CONNELLY IRON SPONGE AND GOVERNOR COMPANY
Chicago, Ill. Elizabeth, N. J.

CP Range Program for 1939

Plans for an extended nationwide promotion during 1939 in behalf of the CP gas range program have been completed, Alan P. Tappan, chairman of the Association of Gas Appliance and Equipment Manufacturers' domestic gas range committee, has announced.

Four major campaigns will project this national promotion during the coming new year, Mr. Tappan stated. They will be put into effect as follows: Spring Campaign (April, May, June); Summer Campaign (July, August); Fall Campaign (September, October); and Holiday Campaign (November, December).

It was announced that in the planning of the coming campaigns much attention was given to "the merchants' point of view." During recent months, over 100 questionnaires had been sent out to leading merchandisers of CP gas ranges in all parts of the country asking for suggestions for an effective 1939 program. These suggestions were collated and embodied in the 1939 promotional plans. It is expected that this national program "will comprise one of the most intensive yet devised."

The American Gas Association's national advertising program will feature 20 range ads during the first eight months of 1939 in such consumer publications as Saturday Evening Post, Good Housekeeping, Woman's Home Companion, McCalls, Ladies Home Journal, American Home, Better Homes and Gardens, House and Garden, House Beautiful, and others. Each of these advertisements will be directed toward acquainting the consumer public with the CP seal and will stress the improved cooking performance of the new CP gas ranges. The national advertising program during the early part of 1939 will reach over 17,000,000 readers.

During the forthcoming CP range promotion, the United States will remain divided in 16 divisions with an equal number of regional managers, under the leadership of Frank M. Houston, chairman of the American Gas Association's Domestic Gas Range Committee. Due to the increase in scope of the national program, additional associate managers are being added to these regional staffs in order to secure greater nationwide dealer and utility coverage. In addition to these new appointments, the Association of Gas Appliance and Equipment Manufacturers is adding to its paid promotional staff additional help at A.G.A.E.M. headquarters to assist in the preparation of localized promotional pieces. The Association is also planning to add new members to its field staff as aids to the regional managers in conducting regional campaigns and meetings.

It was announced that much stress will be made on aiding sales outlets in their local promotional endeavors. Many sales promotion items will be supplied by the A.G.A.E.M. These will include: newspaper mats, window displays, salesfloor demonstrators, direct mailing pieces, hand bills and broadsides, showroom and window banners, bill enclosures, salesmen's visualizers, souvenir banks for customers, and many others.

Material having to do with the Spring Campaign will be mailed to dealers and utility companies on about February 3rd by the A.G.A.E.M. Material for the Summer Campaign will be forthcoming some time next May.

It has been disclosed that the manufacturers of the CP gas ranges have widely acclaimed the 1939 program, cost of which will be approximately double that of the 1938 promotional program.

KITSON HIGH PRESSURE SERVICE GAS VALVE
Kitson G-450 Valve up to 125 lbs. per sq. inch pressure, affords the most effective connection between service, regulator and meter.
Positive in action and being *double-seated*, is gas tight under all conditions and adjustable to all pressures.
Easy to align—never binds, self-cleaning feature prevents clogging.
Makes for low installation and minimum maintenance costs.

G-450 Pat'd.
Immediate delivery in these sizes: ⅜"x¾" — 1" x 1" — 1¼" x ¾" — 1¼"x1" — 2" x2". Complete information and prices on request . . . No obligation.
KITSON COMPANY
2409-15 Westmoreland St., Philadelphia, Pa.
Manufacturers of Kitson Safety Devices (Lovekin Patents) for Domestic Water Heaters . . . Quality Brass Goods for Gas, Water and All Plumbing Uses.

GAS SERVICE STOPS

SINCE 1869 Hays has built dependable brass products for the Gas Industry. Standard, Special Weight, Heavy Pattern and High Pressure Stops to meet all requirements are manufactured by Hays in a full range of sizes. Write for Catalog No. 4 today.
HAYS MANUFACTURING CO. ERIE, PA.

Servel Offers New Refrigerator Models

Greater beauty in cabinet styling, an improvement in the method of air-cooling that provides better refrigeration performance than ever before, and an aluminum ice-cube grid that makes it easier to obtain ice cubes, are the outstanding new features of the 1939 Servel Electrolux refrigerator, according to an announcement by George S. Jones, Jr., vice-president and general sales manager of Servel, Inc., who stated that the new 1939 model is the "crowning achievement" of the company.

"An important factor in designing our new models was the fact that there is a growing swing toward gas as the 'all-purpose fuel' in the modern household," Mr. Jones stated. "Servel, Inc., recognizes the backing of the gas industry as a paramount factor in the increasing acceptance of gas refrigeration. Therefore, it has been the company's policy to maintain the popularity of Servel Electrolux by improving the product from year to year to keep pace with the demands for the best that there is in household refrigeration.

"With a refrigerator that stands at the top, with an advertising and promotional program designed to make it easier than ever before to sell that refrigerator, with definite signs that business generally, as well as the business of selling gas appliances, is better than it was a year ago, and with the prospect of a continuance of that trend, Servel, Inc., offers to its utility accounts a product ideally designed to make history in the sale of gas appliances, not only during 1939 as a whole, but in the immediate Winter selling season which is already successfully under way."

Edward A. Johnson

Edward A. Johnson, Vice President of the Pittsburgh Equitable Meter Company, died at his home in Bellevue, Pa., December 15, at the age of 58. A native of New York City, where he had been associated with the Watson Stillman Company and later as New York District Manager for Duff - Norton Manufacturing Company, Mr. Johnson came to Pittsburgh in 1911 as General Sales Manager for Duff-Norton Manufacturing Company. In 1929 he joined the Pittsburgh Equitable Meter Company and was well-known throughout the gas and water industries of the country.

A.G.A. Technical Section

Dates for the following Conferences are announced: Distribution Conference—Palmer House, Chicago, April 17-18-19, 1939, Chairman—C. F. Turner, The East Ohio Gas Co., Cleveland, O. Joint Committee Conference of the Production and Chemical Committees, Rochester, N. Y., May 15-16-17, 1939. Chemical Committee Chairman—E. M. Bliss, Public Service Electric & Gas Co., Harrison, N. J. Gas Production Committee Chairman, F. B. Parke, The Brooklyn Union Gas Co., Brooklyn, N. Y.

Consolidated Edison Company Elects Two New Trustees

Two new trustees were elected by Consolidated Edison Company of New York, Inc., on December 27 at the regular monthly meeting of the Board—Mrs. Kenneth B. Norton, of Bronxville, New York, who is the first woman to serve on the directorate of a major utility company in the country, and Neal Dow Becker, president of the Intertype Corporation, Brooklyn, New York.

N. D. BECKER MRS. K. B. NORTON

Floyd L. Carlisle, chairman of the Board of Consolidated Edison, said he was particularly pleased to welcome an outstanding woman as a member of the Board of Trustees. He said Mrs. Norton had had wide experience in various women's organizations and had served on the Board of Directors of the Westchester Lighting Company, part of Consolidated Edison System, for the past year and a half. He believed that her election could be construed as recognition of the growing importance of the woman's viewpoint in the public utility business.

Mr. Becker is president of the Intertype Corporation of Brooklyn and chairman of Intertype Limited, London, England, both manufacturers of type setting machinery.

Harris and Eichengreen on A.G.A. Board

D. W. Harris, of Shreveport, La., vice-president and general manager of the Arkansas Natural Gas Corporation, and L. B. Eichengreen, vice-president of the Philadelphia Electric Company, have been elected to the Executive Board of the American Gas Association, according to announcement by Conrad N. Lauer, of Philadelphia, newly elected president of the Association.

Bumper Crop of "1938 Prize Parade" Tag Returns

H. N. Ramsey, chairman of the Sales Promotion Committee of the Gas Water Heater Division of the Association of Gas Appliance and Equipment Manufacturers, and J. W. Clark, chairman of the Water Heating Committee of the American Gas Association (on right) survey with smiles and much satisfaction the largest batch of tags they've received since the "1938 Prize Parade" was launched January 1, to promote sale of gas water heaters. Every tag in this pile—approximately 125,000—represents a gas water heater sold! They come from gas company salesmen, retail dealers and plumbers from all parts of the country. According to points made, those who have sent them in are eligible for various of the 300-odd prizes in this nationwide sales promotional campaign, sponsored by more than 95 per cent of America's gas water heater manufacturers, under the auspices of the Association of Gas Appliance and Equipment Manufacturers. The campaign closed November 30. In addition to gas companies and retail water heater dealers all over the country, approximately 5000 gas company salesmen and 30,000 plumbers participated. Contestants in this promotional project did not compete against one another, each one winning awards directly in proportion to his own sales efforts.

Mr. Ramsey is president of the Welsbach Company, Gloucester City, New Jersey, and chairman of the General Policy Committee of the Association of Gas Appliance and Equipment Manufacturers.

Mr. Clark is Sales Manager of the Stamford Gas and Electric Division of the Connecticut Power Company.

A.G.A. Issues Bulletin on Gas House Heating Installations

A.G.A. Statistical Bulletin No. 34, "Comparative Data on Gas-Fired Central Heating Installations" presents the results obtained from the Eleventh Annual Survey of Gas Central Space Heating Installations in the United States and Canada.

Peoples Gas Booklet "Cooking Made Easy" Now Offered for National Use

Through the courtesy of Clayton G. Cassidy, Advertising Manager, The Peoples Gas Light and Coke Co., Chicago, the booklet "Cooking Made Easy" is offered for use nationally in a new edition which will eliminate localized references to the Chicago company.

The four-color cover, two-color interior, the many original and specially posed illustrations and the excellent recipes, make this an outstanding promotional piece on the four domestic uses of gas, with emphasis on the CP range.

Cost of the new booklet, with the revisions, is based on a uniform price, irrespective of quantity, of 5¼ cents per copy, F.O.B. Chicago, Illinois. This price is substantially lower than that paid by the Chicago company for its copies. Imprinting of local company name cannot be done. Address correspondence and orders to Republic Printing Company, 732 Federal Street, Chicago, Illinois.

American Gas Association Natural Gas Section Headquarters Moved To New York

The Managing Committee of the Natural Gas Section, American Gas Association has announced the removal of the Section headquarters from Dallas, Texas, to New York City, effective January 1, 1939.

E. H. Poe, Secretary of the Section, will remain in charge of all natural gas activities, and will continue to contact the natural gas industry throughout the United States from his new headquarters, where all other sections of the American Gas Association are now located.

The consolidation of the two offices will effect a greater ease of cooperation among the various other sections of the Association in the advancement of the industry's programs and enable the natural gas industry to be better and more completely serviced by the Association.

The widespread growth and expansion of the natural gas industry during the past few years, and the according increase of potential markets in unsaturated territory has prompted this move, according to the Managing Committee. Having a headquarters in New York, the industry will be closer to other organizations conducting research activities in which natural gas companies are interested, especially with respect to problems of exploration, production, and scientific developments. Working closer with the other departments of the Association should enable the Section to better coordinate its activities designed to maintain the industry's position as one of the most stable on the American business front.

The nation-wide programs and activities of the American Gas Association can be more closely tied-in with the Natural Gas Industry's needs. Having all of the facilities of the general headquarters at hand, it is hoped and expected that the Natural Gas Section may be of increasing value to its members.

Niagara-Hudson Advances Morrell and Touchette

James H. Morrell was elected treasurer of Niagara Hudson Power Corporation today at a meeting of the Board of Directors. Mr. Morrell, who was assistant controller, succeeds W. Paxton Little who has retired as treasurer. The Board at the same meeting elected Pierre L. Touchette assistant controller. Mr. Touchette also continues as assistant treasurer.

Mr. Morrell's employment with the associated companies of the Niagara Hudson System began in August, 1916, as an office boy for the Niagara Falls Power Company.

Pierre L. Touchette, assistant controller and assistant treasurer, has been with the Niagara Hudson Power Corporation since its formation in 1929.

Bay Succeeds Brooks as President of Northern Natural Gas Co.

Retirement of Frank H. Brooks, president of Northern Natural Gas Company, effective January 1, and election of Burt R. Bay, executive vice president, to succeed Mr. Brooks as president, was announced at the company's offices here Saturday, December 17, following the annual meeting of the board of directors.

Mr. Brooks' retirement is in conformity with the established policy of the company under its age limit and income retirement plan. His resignation from the presidency of Northern Natural Gas

Public Utility Engineering and Service Corp. Announces Organization Change

William J. Hagenah, president of Public Utility Engineering and Service Corporation, has announced the election of E. D. Uhlendorf as a vice president and director, and M. A. Morrison as secretary of the corporation. It was also announced that the board of directors of the corporation has been reduced from fourteen to five members.

The reorganization of the board of directors of Public Utility Engineering and Service Corporation at this time, Mr. Hagenah said, is on account of negotiations that are now in progress for the reacquisition of the service corporation by Standard Gas and Electric Company as a wholly owned subsidiary. By such reacquisition it is believed Standard Gas and Electric Company would be in a better position to more fully comply with the spirit of the Public Utility Act of 1935.

On October 5, 1938, the board of directors of Public Utility Engineering and Service Corporation elected Mr. Hagenah as president to succeed Bernard W. Lynch, who previously had been president of both Public Utility Engineering and Service Corporation and Standard Gas and Electric Company. At that time, it was announced, this change was made as a result of the reorganization of Standard Gas and Electric Company under Section 77B of the Federal Bankruptcy Act and Mr. Lynch remained as president of Standard Gas and Electric Company.

The board of directors of Public Utility Engineering and Service Corporation now consists of Mr. Hagenah, Henry C. Cummins, Bernard F. Braheney, Mr. Morrison and Mr. Uhlendorf. All of the present directors, with the exception of Mr. Uhlendorf were formerly members of the board.

Snyder Is Sales Representative for Alexander Milburn Co.

The Alexander Milburn Co., manufacturers of Spray Finishing Equipment and Cutting and Welding Apparatus, announce the appointment of Frank P. Snyder as sales representative in Detroit.

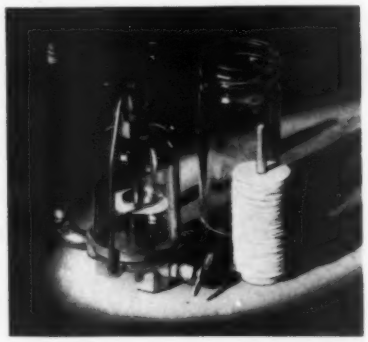
ALFRED I. PHILLIPS
CONSULTING ENGINEER
Rate Developments Valuations
Reports Design
Management
53 PARK PLACE NEW YORK

CRUSE-KEMPER COMPANY
STEEL PLATE CONSTRUCTION
AMBLER, PA.
GAS HOLDERS
HOLDER INSPECTION
RIVETED OR WELDED FABRICATION & ERECTION
TANKS, BINS, FLUES PURIFIERS, WELDINGS

New H_2S Tester Uses Prepared Disks

A new and less expensive device for testing gas for H_2S has recently been announced by Connelly Iron Sponge & Governor Company, 3154 S. California Ave., Chicago, and 200 S. 2nd St., Elizabeth, N. J.

Known as the Smyly H_2S Tester, this instrument uses specially prepared, dry paper test disks, pre-treated with the required amount of lead acetate. These



disks are extremely sensitive and are said to react to ¼ grain H_2S per 100 cubic feet of gas in a one minute test. Disks are furnished by the manufacturer on a spool, in an air-tight glass container. They can be kept indefinitely.

Tests can be made in one minute. A disk is slipped into the glass chamber and gas turned on. After the test, the disk is dated and filed for permanent record.

An illustrated Bulletin, recently issued by Connelly Iron Sponge & Governor Company, gives full details regarding this new device.

INDUSTRIAL GAS BOILERS

Tubular or Flueless
¾ to 45 H.P.

P. M. LATTNER MFG. COMPANY
CEDAR RAPIDS, IOWA

New Officers of Koppers-Rheolaveur Company

Joseph Becker, vice president and a director of Koppers Company, also has been made president of Koppers-Rheolaveur Company, designers and builders of coal washing plants. W. S. McAleer, manager of Koppers-Rheolaveur, has been made a vice president and director of the company.

Mr. Becker is also general manager of Koppers Company's Engineering and Construction Division. He has been with the company since its beginning and has been an official since 1920. He is the inventor of the Koppers Becker type of coke oven and of processes for the recovery of derivatives in the manufacture of gas and coke.

Mr. McAleer joined the former Koppers Construction Company (now the Engineering and Construction Division of Koppers Company) as an engineer in 1926. He joined the sales department in 1930. He was made manager of Koppers-Rheolaveur last July.

Penn Announces Changes in Branch Office Personnel

A number of recent changes in branch office personnel, and the addition of one new branch office, have been announced by R. H. Luscombe, sales manager, Penn Electric Switch Co., Goshen, Indiana.

A. W. Barr, who has been associated with the automatic control industry for many years, has been named manager of the company's Boston office. Mr. Barr has a wide acquaintance in automatic heating, refrigeration, and air conditioning fields, and is especially conversant with business conditions in New England.

A. L. Rubel, who has been manager of Penn Electric Switch Co's Boston office, since it was opened in 1933, has been transferred to take charge of the company's Philadelphia branch, which was opened last spring.

D. A. Coon, who opened the company's Philadelphia branch last spring, was placed in charge of the new branch opened at St. Louis in September.

Catalog With Leak Loss Chart. The distinctive feature of a new catalogue brought out by M. B. Skinner Co., South Bend, Indiana, is a "leak-loss" chart which embodies graphic information valuable to anyone operating pipe lines.

This chart shows how much steam, water, oil or air escapes from various size leaks in pipe, under various pressures. Figures show what these leaks cost at various unit prices and thus one can visualize the losses which can occur from what are often thought to be harmless leaks.

Nine different styles of pipe repair clamps, for stopping leaks without replacing pipes, are shown in this catalogue, under their trade-mark "Skinner-Seal." A mighty interesting booklet sent on request.

Polk Appointed Eastern Sales Manager

Robert E. Polk has been appointed Eastern sales manager of General Gas Light Company with headquarters at 23 Warren Street, New York City, effective January 1. For a number of years Mr. Polk, as general manager of Equitable Sales Company and utilization sales manager Equitable Gas and Duquesne Light Co's, of Pittsburgh, Pa., has been in charge of all appliance merchandising and gas heating sales for those companies.

W. Jennings Young

W. Jennings Young, president of the Northern Oklahoma Gas Company, of Ponca City, Oklahoma, died November 26, 1938.

Jennings Young, as he was known to his many friends in the industry, has had a long and colorful career. He was born in Butler, Pennsylvania, in 1896. His college course was interrupted by 18 months' service in the World War where he served in the Heavy Artillery. He finished his college career in 1920, and in October of that year was employed by the Oklahoma Natural Gas Company, of Tulsa, Oklahoma, in the meter department, and during his 18 years' service with that company, worked in nearly every department. He was vice president in charge of operations at the time of his resignation in May of this year when he accepted the presidency of the Northern Oklahoma Gas Company, at Ponca City.

Mr. Young was an active member of the American Gas Association, having served on many committees under the natural gas department. He was second vice president of the Southern Gas Association and vice president of the Oklahoma Utilities Association.

Food For Thought

1. 20,000 miles of mains surveyed.

2. 14,000 new gas leaks located.

3. 40,000 valuable reports made on trees and shrubs.

4. 150 companies using the service.

5. Enough savings in unaccounted for gas to pay the bill.

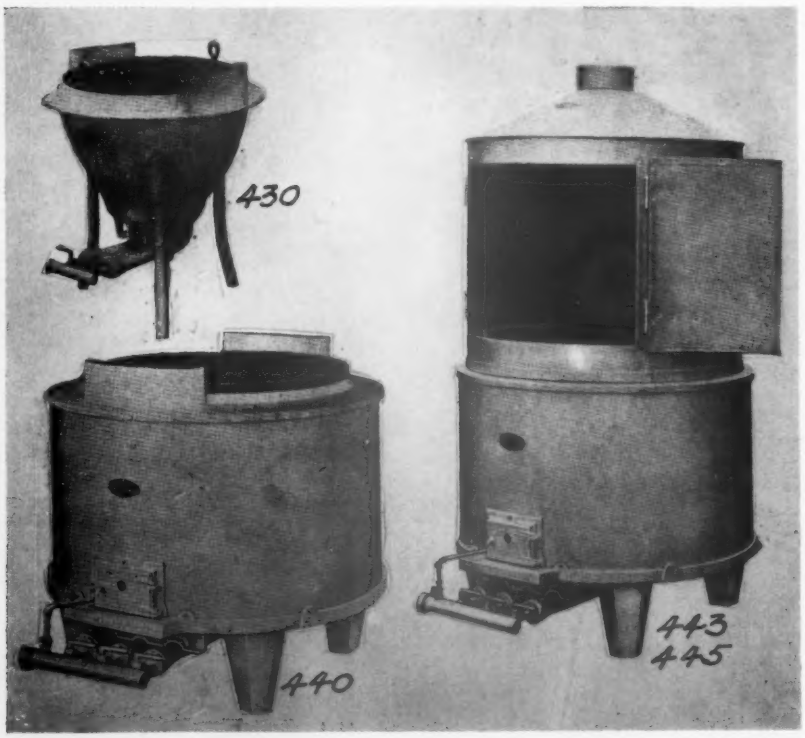
6. A trial will convince you.

May we hear from you?

New England Forestry Service Inc.
75 Federal St., Boston, Mass.

(Continued from page 28)
self it serves as a plating material for steel and copper sheets.

In a local plant having three 1800 pound and two 3000 pound tinning furnaces used for plating copper sheets, gas replaced oil and effected a tremendous saving. The following figures were taken during the competitive tests:—

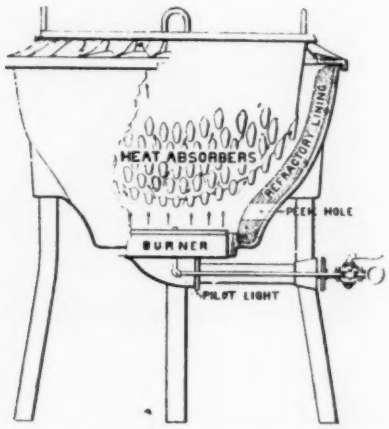


Typical Soft Metal Furnaces of Atmospheric Type
No. 430—Pouring Type (1000 lbs. Capacity); No. 440—Pouring Type (2500 lbs. Capacity); No. 445 with hood, No. 443 Bottom Outlet Type (2500 lbs. Capacity).
Surface Combustion Corporation.

	Gas Kettle	*Oil Kettles*
Number of Kettles on Production	1-1800 lb.	2-3000 lb.
Hours Kettles Lighted	9 hrs. 30 min.	12 hrs. 30 min.
Time to heat to 650° F	1 hr. 47 min.	4 hrs. 30 min.
Hours Available for Production	8 hrs.	8 hrs.
Fuel to heat up	550 cu. ft.	100.76 gals.
Fuel used during production	1800 cu. ft.	63. gals.
Total fuel used	2350 cu. ft.	163.76 gals.
Total weight tinned	2420 lbs.	6556 lbs.
Total area tinned	2967 sq. ft.	7516 sq. ft.
Ave. fuel per ton tinned	1942 cu. ft.	49.95 gals.
Ave. fuel per M sq. ft. tinned	792 cu. ft.	21.79 gals.

(Note:—Gas 900 Btu. The Btu replacement per ton tinned was 1 Btu gas = 3.99 Btu oil and per 1,000 sq. ft. tinned was 1 Btu gas = 4.28 Btu oil.)

In analyzing these data it will be noted that in the melting down period the gas kettle melted 3.28 pounds of tin per cubic foot as against 59.5 pounds per gallon of oil. This represented a Btu replacement of 1 of gas to 8.55 of oil, an abnormal figure to say the least. During the actual production period the Btu replacement was 1 Btu of gas to 2.01 of oil. An examination of the furnace settings gave the answer to the poor showing of the oil, and demonstrated once again the fairly prevalent laxity of factory management towards the question of fuel economy as long as production schedules are met. Steam atomization was used with the oil burners, and these fired into a massive firebrick combustion chamber placed well below the kettle itself. The kettle was effectively protected by firebrick against any flame impingement, a desirable feature as far as pot life went but highly detrimental to good efficiency. The combustion chamber was directly connected to a stack of considerable height and area, possessing a pull sufficient to "blow your hat off", as the operator said. Most of the oil combustion took place somewhere within the chimney. In converting these furnaces to gas, we placed a four ring multitube atmospheric burner with 350,000 Btu per hour input 7" below the 1800 pound pots, and a five ring burner of 600,000 Btu input 9" below the 3,000 lb. pots. The direct stack connection was eliminated and the hot products of combustion allowed to circle up around the pot and discharge at the top of the setting, being taken out of the room through the hoods placed over each pot. The kettles were originally on hand control; and as each ring varies in size and has its own valve, the operator was able to keep his heat at just the desired point. According to the plant officials the change to gas cut the fuel cost of this department to one-fourth of its previous figure.



Sectional View of No. 420 and No. 430 soft metal furnaces.

That the above example of higher fuel economy with gas is not an isolated case was proven in another plant devoted to the lining of railway journal brass castings with babbitt metal, a low melting alloy of either lead or tin base containing small amounts of antimony and copper. In this operation one solder pot and one babbitt pot are located side by side in a twin setting of firebrick. The solder pot was 35" x 25" x 7" deep, holding 375 lbs. The babbitt kettle was 30" in diameter by 12" deep, holding approximately 2,000 lbs. of lead base babbitt. Originally fired by oil burners using oil at 30 lbs. and air at 1 lb., they were converted to

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	Gas Firing	Oil Firing
Hours operated	9 hr. 15 min.	9 hr. 7 min.
Babbitt charged	2,100 lbs.	2,075 lbs.
Solder charged	400 lbs.	375 lbs.
No. of bearings lined	400	330
Weight of bearings lined	7,000 lbs.	6,666 lbs.
Av. weight of bearing casting	17.5 lbs.	20.2 lbs.
Fuel consumed	2,470 cu. ft.	35 gallons
Fuel per ton bearings lined	705 cu. ft.	10.51 gallons
Btu replacement	1	1.99

gas by means of two four-ring atmospheric multitube burners as described above. In operation, the castings are preheated for about 2 minutes by being dipped in the solder kettle, then placed in mandrels and babbitt poured in from the other kettle.

(Note:—1050 Btu natural gas)

McKee Ladle Babbit Melter. *Eclipse Fuel Engineering Company.*

Zinc

Zinc, the third of the "soft metals," has the highest melting temperature (787° F) and the greatest heat content, but is still in a range where it can be melted by atmospheric type burners although, as a matter of fact, blast type burners are far more common. It differs considerably from lead and tin, however, in its destructive action on iron containers at melting temperatures. Zinc and iron form an alloy that, mixed with a saturated solution of iron in zinc, forms the "dross" of galvanizing kettles. Ordinary cast iron pots have a very limited life when used in quantity melting of zinc; and as a rule it is far more economical to employ alloy pots. Special pots are available containing chrome that are satisfactory for this purpose.

The greatest use for zinc is in galvanizing, which is merely the coating of iron and steel articles with nearly pure zinc. When exposed to ordinary corrosive agents the zinc dissolves, protecting the steel. This subject was covered in the June 1938 AMERICAN GAS JOURNAL. Another extensive use for zinc is in the manufacture of brass, an alloy of copper and zinc. This will be taken up in the next article when the higher melting metals are discussed. Zinc is also of importance in the die casting industry, and the following figures were obtained in a large local plant where some 25 tons a day are melted for this purpose:—

Furnaces—Tilting type equipped with blast burners and sticktite nozzles. Alloy iron pots of 1400 pound capacity. Get 10 heats in 8 hours with a gas consumption (900 Btu) of 62 cubic feet per 100 pounds. This is equivalent to an efficiency of 26% which is fair practice in view of the emphasis placed on speed.

In this same plant a converted oil furnace of 3,000 pound capacity, 44″ in diameter by 19″ deep in a 9″ firebrick setting, was fired by means of two low pressure inspirator sets, each with a 1½″ sticktite nozzle firing tangentially. The best results were obtained when one burner was used at the start and the second turned on only when the zinc started to melt. Under these conditions a 2760 pound charge was melted in 2½ hours with a gas consumption of 1,500 cubic feet (900 Btu mixed gas). Using one burner for the entire time required only 1400 cubic feet but took 3¼ hours. Two burners on full from the start required only two hours but used 2150 cubic feet.

(To be continued in next issue)

New Gas Equipment and Public Relations

(Continued from page 18)

not be expected to remove the difficulty. Many systems will require not only adequate cleaning installations at city gates, but also at other points in order to remove the additional dust which is produced in the lines within the city limits. The location and the amount of cleaning equipment needed must, of course, be determined by careful study of the prevalence of dust in each individual system, and of the type of trouble which can be traced to the existence of this dust.

Until recently the interest of the gas industry in the dust problem has been solely in its effect on pressure regulators, meters, and other equipment operated by the companies. In many cases the damage from this dust was not considered sufficiently great to warrant extensive cleaning installations, but the growing tendency at present is to view this problem from the standpoint of its effect on our potential voter, the customer, and on the ultimate load to be built up from increased use of new appliances and the improvement of the competitive position of gas.

More and more gas engineers are thinking in terms of Mr. Anderson's remark that their problem is not merely "Keep gas on the town," but "Keep gas on the appliance."

Friez Has New Boston Office

The Boston Office of the Air Conditioning Utilities Company moved on December 1, 1938, from their old address at 110 Arlington Street to nearby and larger premises at 436 Statler Building, Boston.

The New York and Boston activities are under the direction of Mr. Harry W. Fiedler, factory representative for Julien P. Friez & Sons Division of Bendix Aviation Corporation, Baltimore, Maryland. The fine offices and displays now provided in both centers insure first-class service for local users of Friez-Baltimore products.

Patterson is Roberts and Mander New York Manager

Roberts and Mander Stove Company, Hatboro, Pa., announces the appointment of Mr. Donald W. Patterson as Manager of their Metropolitan New York Division.

Mr. Patterson has been Assistant Manager of the Roberts and Mander Stove Company's New York office for the past twelve years and is well known by members of the Gas Industry in Greater New York.

The appointment of Mr. Patterson follows the recent death of Mr. J. R. Stetser, Sr., who for many years served in the capacity of New York Division Manager, Assistant Secretary and Director of the Roberts and Mander Stove Company.

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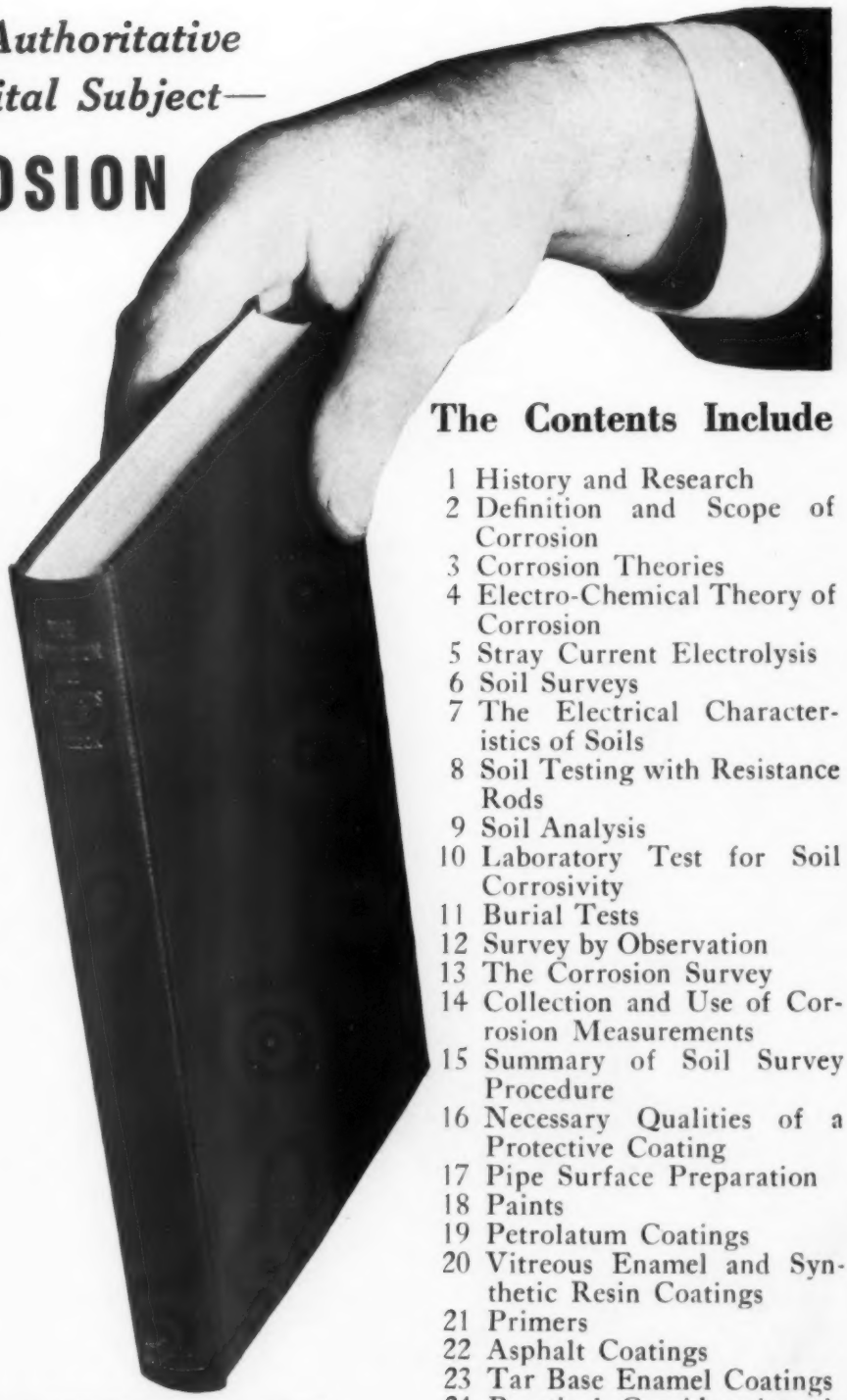

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